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STEEL

For forty-eight Years—IRON TRADE REVIEW

PRODUCTION • PROCESSING • DISTRIBUTION • USE

The Week in Perspective

OUT of the frying pan and into the fires of labor discord jumps the NRA, codes and all. Steel and the closely-allied coal industry are among the first to feel the searing heat as labor, inflamed by newly-visioned power, resorts to walkouts and picketing in the effort to win higher wages and recognition of unions. Strike-ridden coal mines mean a scarcity of coke for steel producers, leading a Pittsburgh steelmaker (p. 55), to import coal from Alabama. . . . Steel buyers, too, have their difficulties, with four new forms of contracting available under the steel code; large buyers are inclined to favor the percentage form (p. 55) with a maximum tonnage proviso. . . . The federal government turns buyer, dangling a 700,000-ton steel rail order (p. 11) before producers, and seeking a price concession.

Buyers Wrestle with New Pricing Methods

Automobile company purchasing agents are nettled by the establishment of full extras and differentials on their steel needs, Sept. 30 having marked the passing of the day when these extras were waived for tonnage buyers. . . . Ford, ever in the limelight, parries with the threat (p. 16) to reopen the River Rouge steelworks, and plans an industrial exposition in Detroit this month as a sales stimulus, the latter to be a refinement of the successful exposition held in Cleveland this spring. . . . From the confines of motordom emerges the news (p. 15) that new models are nearing the production stage, but in the main will be kept from the public until January. Test cars in Detroit reveal a pronounced trend toward streamlining, especially on front ends.

Mills Rushed But Operating Rate Slides

Stocking the largest tonnages of sheets, strip and bars in history, automobile manufacturers the past week specified fully against third-quarter contracts (p. 16), and lost no time in contracting for fourth-quarter needs, since by effecting the latter before Sept. 30 savings of $2 a ton in plates and shapes and $3 a ton in bars could be realized. . . . New steel prices for Michigan users are tempered somewhat by restoration of old differentials on bars, strip, sheets and cold-finished steel, the net result being a figure less than the base price plus freight. . . . While mills are being rushed to meet late specifying against old contracts, the national operating rate last week (p. 18) slipped 2 points to 38 per cent, chiefly as a result of labor troubles.

Exports Climb; Foreign Markets Brighten

An increasingly favorable trade balance for iron and steel was registered in August, export shipments (p. 23) being just short of four times those of the corresponding month last year.

Steel water tank contains complete aeration system: Built by McClintic-Marshall Corp., for Garden City, L. I., water cascades over trays before entering storage space. The tank is surmounted by an aviation obstacle light

Sharp declines are being shown in imports of iron and steel products. . . . Radio reports from London (p. 75), indicate trade sentiment there is brightening noticeably, with inquiries for steel trending upward and preparations under way for increasing production. . . . More demands are being made upon the RFC (p. 19) for credit to promote trade with Russia. Diplomatic recognition is not seen as essential.

Alloy Steels Meet Needs of the Day

Confronted with difficulty in removing heads of countersunk high-tensile manganese steel rivets, a large engineering company prospected for a new steel which would better meet these needs. Experiments finally indicated that a chromium-manganese-silicon steel provided the necessary hardness, without being excessively brittle. Further it was discovered that the grain structure of the latter material was refined by contact of the hot rivet with the cold metal being joined. . . . Boiler tubes of steel containing 0.50 per cent molybdenum can be made thinner (p. 43) as a result of increased high-temperature and creep strength. . . . Steel tubes containing 5 per cent chromium (p. 49) provide superior corrosion resistance in refrigerator coils.

Put Castings on Standardized Basis

Co-operation of interested producers and consumers has aided appreciably (p. 30) in the progressive refinement of specifications for alloy steel castings, under direction of committees of the American Society for Testing Materials. Tests have been standardized and properties grouped in well-defined classes. . . . Consolidated specifications for carbon steel castings have been approved (p. 40). . . . Contract has been let (p. 17) for 48,500 tons of cast iron and 3300 tons of cast steel segments for lining a tunnel under the Hudson river. Requiring 25,000 tons of pig iron and the remainder cast scrap, these segments will be made up into rings 30 inches wide, with 15 segments to the ring.

Technicians Convene To Exchange Ideas

Convention and football seasons are officially under way (p. 24) the former providing a respite to the technically minded from the complexities of NRA and economic nightmares. . . . Steel production problems will be in the limelight at two meetings to be held soon (pp 34 36) in Pittsburgh. . . . Fabrication of steel by flame machining held attention at one session of the International Acetylene association in Chicago last week. . . . Chicago also was the scene of a recent exhibition (p. 16) of brewing equipment, ten manufacturers of steel barrels being numbered among the 237 exhibitors.

The VOICE of INDUSTRY

Communications appearing here do not necessarily reflect the opinion of STEEL *or of its editors.*

A New Yardstick for Salaries?

To the Editor:

The business adage, "pay a man what he is worth" may not be such a problem after all, if modern developments in management mean what they indicate.

Accounting, since accounting was first exploited, has charged operating expense to product through departmental equipment, inventories, salaries and wages, with very little attention given to the human element that requisitioned or caused the expense. Every cent of expense, in every corporation, is caused or requisitioned by some employe or the owner. Likewise every employe has assets of the corporation with which he is using to perform his duties, these assets having been originated in obligations of the corporation. Capital structures of corporations are sacred nowadays and are seen in all their glory only by the members within the inner sanctum. So employes do not know the value of the assets with which they are working, nor the obligations that were entered into to build the assets.

A group of business men in Chicago have changed their accounting systems with the idea that finance, in all of its ramifications, flowing through a corporation, should be tied up with employes, not with product. The total capital structures of their respective corporations are broken down and allocated to all employes. Every employe knows the value of the assets he is using and what his value is in terms of results to the corporation. These employers can intelligibly buy profitable employes. When an employe knows the yardstick by which he is measured, naturally he wants to be a valuable employe and therefore he increases his own earning power by becoming more valuable to his employer.

As I see it, the only drawback to this system, with employes on a contingent basis of earnings, owners must share their good times as well as their bad with their employes. The orthodox belief that an employe assumes no risk of the corporation is out of date, for jobs, as well as every thing else in this life, are a gamble. However, if all employes were on the same basis of earnings, depending on the responsibility and the market value of their services, it would work toward the advantage of both the employe and the employer that efficient service be rendered.

Is there any more fair way of distributing salaries and wages?

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Chicago

Machinery, NRA and Profits

"Improved machinery is the answer to industrial recovery most likely to produce immediate and tangible gains for both capital and labor. There is no objection to shortening the work week by 20 per cent if individual productivity can be increased correspondingly. There is no objection to higher wages if output per worker is raised accordingly.

"With the limitations of the administration upon rapid price increases, improved machinery offers probably the major answer to the problem of effecting adequate earnings for industry and for labor."

From "A Key to Industrial Recovery,"
Published by the Farrel-Birmingham Co., Inc.
Ansonia, Conn.

Institute May Compile Freight Tariffs; Surcharges Removed

COINCIDENT with elimination of the freight surcharges on both carlot and less-than-carlot shipments of iron and steel, Oct. 1, comes unofficial word that the American Iron and Steel institute plans the compilation of a series of freight rate schedules covering all iron and steel products. Harry C. Crawford, Bethlehem Steel Corp., Bethlehem, Pa., is said to be heading up a committee under whose direction the work will be achieved. It was thought that the first of these schedules will be available to institute members by around Nov. 1.

Producers will be called upon to supply rates, both carlot and less-than-carlot, from all basing points in their respective districts to logical consuming plants. These rates may be compiled by states. An organization meeting was understood to be held in Pittsburgh last week at which questions of procedure were discussed. The undertaking of this work by the institute, it is asserted, not only will save the 170 or more signatories of the code a substantial sum, but will result in an authoritative list which should eliminate misunderstandings which constantly arise where each company compiles its own tariffs.

It is believed there will be three volumes covering the finished products, each one presenting, respectively, tariffs in the East, West and South; other additions will be compile dcovering pig iron, semifinished and certain raw material rates.

Surcharges Taken Off Oct. 1

The surcharges, which went off Oct. 1, were first established as an emergency measure on Jan. 4, 1932, these following the inauguration of new class rates on Dec. 3 in the preceding year. The elimination of these surcharges results, it is estimated, in a decrease in finished steel products freight rates of 2 cents a net ton; in coal, coke and ore, 6 cents; and in pig iron and scrap, 12 cents.

With the surcharges eliminated, the carload rate on iron and steel from Pittsburgh to New York is 33 cents, as against 35 formerly; to Philadelphia, 29 cents, against 31; and to Baltimore, 27, against 29. From Buffalo to Boston the carload rate is 34 cents, as against 36. Boston now takes the rate of 30 cents from Coatesville, Pa., and 28.5 from Bethlehem, Pa.

New York takes an 18-cent carlot rate from Coatesville, and a 15.5 rate from Bethlehem, while Philadelphia takes an 8.5c rate from Coatesville, and a 10.5c rate from Bethlehem. On semifinished steel the rate from Pittsburgh, to New York is now $5.70 per gross ton; to Philadelphia $5.30 and to Baltimore $5.10.

Incidentally, the establishment of certain new basing points under the steel code has focussed particular interest on rates from such producing points in the East as Bethlehem, Pa., for instance, on alloy bars and alloy bilets, and from Syracuse, N. Y., on tool steel, and Sparrows Point, Md., on pig iron, to say nothing of rates from certain other newly established basing points in the East, such as the numerous points on iron bars.

Rail Distribution Awaits Lower Price

THIS week producers of rails are expected to submit a reduced price to tempt the public works administration at Washington to loan upward of $25,000,000 to the railroads to finance purchases.

The tonnage most generally mentioned is 700,000. An additional 30 per cent would be for fastenings. It is estimated that such a tonnage would keep rail mills operating at about 35 to 40 per cent for a year.

Thus far in 1933 the railroads have purchased 138,384 tons of rails, compared with 185,000 tons in all of 1932. Actual production of rails in 1932 was 402,566 tons.

Standard rails are currently quoted at $40. The opinion is that not more than $2 will be conceded. Since the President inaugurated his program, soft steel bars have been advanced to $35 a ton and plates and shapes to $34.

Secretary of the Interior Ickes will probably handle the price matter.

A definite announcement of tonnage is expected shortly. Unofficially it is said that the Illinois Central, New Haven and Union Pacific each are willing to take 20,000 tons, the Burlington 25,000, and the Santa Fe 35,000. Government loans for rails probably will be on the basis of 4 per cent on 10-year notes with the first year's payment to be deferred.

Myron C. Taylor, chairman of the United States Steel Corp.; E. G. Grace, president of the Bethlehem Steel Corp.; L. E. Block, chairman of the Inland Steel Co., and Arthur Roeder, president and receiver, Colorado Fuel & Iron Co., conferred recently with the President, Railroad Co-ordinator Joseph B. Eastman, and Donald R. Richberg, general counsel for NRA.

Aim Strike Threat at Key Points

THE rattlesnake of labor strife has struck once and today its poisonous head sways menacingly over two other strategic points in the iron and steel industry.

Thus far the only strike directly affecting the operations of a major steel producer is that which was called Sept. 27 in the Weirton and Clarksburg, W. Va., and Steubenville, O., divisions of the Weirton Steel Co., subsidiary of National Steel Corp. The trouble started Sunday night when a few workers in the tin mill walked out. Others joined the strikers on Monday and by Wednesday certain departments in the works in all three cities were affected.

Workers have not presented any complaints through the agency of the company's employe representation plan. The president of the newly formed Weirton chapter of the Amalgamated Association of Iron, Steel and Tin Workers declared that the walkout was called to force recognition of that union by the Weirton Steel Co. Other officials of the Amalgamated association admitted that the strike was premature and unauthorized.

Won't Bring Men In

E. T. Weir, chairman, National Steel Corp., said, "We will not bring men in to keep the mill open, but we will operate just as long as the men there want to work. What business we have, of course, will go away to our competitors."

Settlement of the strike probably will be delayed until Tuesday at the earliest, as Mr. Weir stated that no move would be taken by the company until then.

In organizing daily demonstrations by coal miners at the Clairton, Pa., works of the Carnegie Steel Co., union leaders are trying to strike at the bottleneck in the fuel supply for subsidiaries of the United States Steel Corp. While the cry of the miners, "we won't go back until Frick signs the code," may be sincere insofar as the soft coal labor situation is concerned, it is felt that the Clairton demonstrations are the preliminary maneuvers in a broad

attempt to unionize the steelworkers in the Pittsburgh area.

The enthusiasm of the strikers was stimulated Tuesday when Gov. Gifford Pinchot of Pennsylvania publicly expressed a sympathetic attitude toward the demonstrators. The Carnegie Steel Co., through its president, I. Lamont Hughes, had sent a message to the governor protesting against the demonstrations. Governor Pinchot replied as follows:

"If the Carnegie Steel Co. is threatened by striking miners, it has nothing but the blind and brutal conduct of affiliated officials to thank for it. The moment these officials cease to let their willful and antiquated prejudices against organized labor stand in the way of national recovery and sign the coal code the trouble will be over. Now that this violence is recoiling upon you, and you are getting a taste of your own medicine you run to me for help. I have already suppressed the violence of your deputy sheriffs in Fayette county."

Says Hughes to Pinchot

Mr. Hughes, on behalf of the Carnegie company, answered with this message:

"Ignoring your unjustified assaults upon the integrity of the officials of the United States Steel Corp. and its subsidiary companies, you are advised that the Carnegie Steel Co. does not mine or produce coal. Our only purpose in wiring you was to perform our duty to notify you, the chief peace officer of the state, of a situation which was and still is extremely dangerous. The continued operation of our plants, employing thousands of men, is certainly an aid to the recovery program, and any interference, especially from outside sources, will serious retard any possible recovery."

Up to Friday evening the demonstrations and picketing of the Clairton works had had no effect upon the steel workers there or in the works of nearby independent companies.

In fact, aside from the Weirton situation, the only effects in the steel industry of the widely scattered labor trouble throughout the industrial sections of the country are sporadic delays in scrap shipments, some slight interruption to warehouse shipments in the East due to truck drivers' strikes and the stoppage of fuel supplies from certain western Pennsylvania sources. To meet this last named situation, Steel corporation subsidiaries are bringing in coal from the South.

Attack Open Shop Detroit

The strike of die and toolmakers in Detroit is another thrust at the iron and steel industry, although primarily it is intended to be the entering wedge of a campaign to unionize the open shop automobile industry. It is a strategic move, calculated to hit the motor car manufacturers at the time when work on new models is getting under way.

Bethlehem Employe Plan 15 Years Old

BETHLEHEM STEEL CORP.'S employes' representation plan is 15 years old, its anniversary being observed in the Sept. 25 issue of *Bethlehem Review.*

Founded in October, 1918, this plan was the first of its kind to be introduced in American industry. It was a pioneer step in labor relations, according to E. G. Grace, president of Bethlehem.

Now, 15 years later, the national industrial recovery act recognizes the value of such a plan under its provisions for collective bargaining. Says Mr. Grace further:

This means of collective bargaining has stood the test of time. It has served both employes and management in prosperous days and in hard times, and meets the requirements of the new law.

At its inception I stated that our plan would be made an integral part of our business. That this has been done is evidenced by the important place it has come to occupy in our current affairs.

The plan has become vital in the administration of our business, accordingly as it does a method for the establishment of fair and proper schedules of wages, hours and other working conditions, and for guiding the various economic betterment plans which have been organized among and for the benefit of the employes over the last fifteen years.

No outside agency could possibly take the place of our employes' representation plan without destroying that all-essential direct contact and relationship so necessary to insure to employes the best possible working and living conditions, and to management the cooperation of an intelligently informed body of employes.

Under the plan, the employes have been kept constantly advised, through their elected representatives, of the conditions of our business; and the part they have played in counselling and originating constructive labor policies is an attainment of which every employe can well be proud.

The principles of our plan have been adopted by all other important steel companies, and by many large organizations in other industries. Meeting the requirements of the NIRA, our employes' representation plan continues to serve as the medium of representation just as it has in the past. I urge all employes to continue to use to the full the facilities of the plan for presenting their needs and views. That is its purpose. No question can be raised by an employe that can react in any way against him.

The elected representatives under the employes representation plan have performed their duties in a fearless, intelligent and constructive manner. Non-discrimination is the very fundamental of the plan. A rigid adherence to this policy has been a powerful factor in making the plan a continuing success, and no interference with this policy will be tolerated.

From October, 1918, to June, 1933, at the plants of the Bethlehem Steel Co. and the Pacific Coast Steel Corp., 5918 cases have arisen, including employment and working conditions, wage rates and tonnage schedules, safety, practice, sanitation, housing, pensions and relief, athletic and other problems. Of this total, 3932 cases were disposed of in the affirmative, 849 in the negative, 375 were withdrawn and 762 were compromised.

Spring Makers Organize

An association representing about 75 per cent of the springs manufactured in the United States has been formed and is known as the Spring Manufacturers' association Inc., with headquarters at 415 Root building, Buffalo.

Officers are as follows: President, Fuller F. Barnes, chairman of board, Wallace Barnes Co., Bristol, Conn.; vice president, J. W. Campbell, Cleveland Wire Spring Co., Cleveland; secretary and treasurer, E. I. Neithercut, formerly secretary and director of the Bridgeport Brass Co., Bidgeport, Conn. and until recently executive secretary of the Connecticut State Unemployment association.

Carnegie in Detroit Moves

Detroit district sales office of the Carnegie Steel Co. and Illinois Steel Co., in charge of W. B. Weston, were moved to 9-236 General Motors building, Oct. 2. Other Detroit offices of United States Steel Corp. subsidiaries also have moved to the ninth floor of the General Motors building, including the American Steel & Wire Co., American Sheet & Tin Plate Co., American Bridge Co. and National Tube Co.

Traffic Club Holds Outing

Traffic Club of Pittsburgh held its fall golf outing for members and guests at the Highland Country club, Pittsburgh, Sept. 28. B. S. Thomas, traffic manager for Standard Sanitary Mfg. Co., is president of the club, and F. N. Ewing, traffic manager of Harbison-Walker Refractories Co., Pittsburgh, was chairman of the outing committee. Several hundred attend-

Foreign Engineers at Koppers

Sixty leading foreign engineers inspected the plants of the Koppers Co. at Pittsburgh, Sept. 30.

Institute Releases Additional Regulations Affecting Code

ADDITIONAL commercial resolutions dealing with the marketing of iron and steel products under the terms of the code have been released by the American Iron and Steel Institute.

Resolutions numbered from 12 to 24, inclusive, were adopted by the board of directors on Sept. 20. Resolutions from 1 to 11, inclusive, were adopted on Aug. 29. The material recently released by the institute includes all of the resolutions adopted Sept. 20; resolutions numbered 9, 10 and 11, adopted Aug. 29; and resolutions numbered 6 and 8 as amended Sept. 20.

Resolution No. 6, dealing with products sold for indirect export, was published on page 15 of the Sept. 11 issue of STEEL. It was amended Sept. 20 to include rolled steel car wheels and rolled or forged axles.

Resolution No. 8, which permits reductions in the delivered prices where products are delivered by ocean, or rail and ocean, or rail-ocean-rail transportation to South Atlantic, Gulf or Pacific coast points, was amended Sept. 20.

The remaining resolutions, excepting No. 18 which provides for delivered prices in Alaska and the Canal Zone, are as follows:

Rates of Interest

Commercial Resolution No. 9

The following resolution was adopted by the board Aug. 29:

"RESOLVED that the Board hereby establishes, pursuant to the provisions of Section 6 of Schedule E of the Code, six per cent. (6%) per annum as the minimum rate of interest that each member of the Code shall charge and collect on the amount of any invoice for products sold by such member after the effective date of the Code remaining unpaid after the expiration of the period of free credit allowed by such member in respect of such invoice in accordance with the provisions of said Section 6; and that the Secretary be, and he hereby is, directed to mail a copy of this resolution to each member of the Code."

Pig Iron Differentials

Commercial Resolution No. 10

This resolution, adopted by the board Aug. 29, recognizes long-existing differentials between delivered prices of southern foundry pig iron and of northern and eastern pig iron. It follows:

"RESOLVED that, until otherwise determined by the Board, any member of the Code which shall produce pig iron at any plant located in the Southern Wage District or in the Birmingham Wage District be, and it hereby is, permitted in quoting and billing for such pig iron sold by it for delivery outside of such Districts, to allow a reduction in its published base price for such pig iron at the basing point on which such base price shall be based by an amount of not more than thirty-eight cents (38c) per gross ton."

Plates, Shapes, Bars

Commercial Resolution No. 11

This resolution adopted by the board, Aug. 29, concerns the place of delivery of plates, shapes and bars for an identified structure to which there is no through freight rate with fabrication-in-transit privilege. The resolution follows:

"RESOLVED that in any case in which the published freight tariffs of the rail road companies do not provide through rates with the fabrication in transit privilege on plates, shapes or bars from the plant of a member of the Code to the freight station at or nearest to the place at which such products are to be used in the erection of an identified structure, then the place of delivery of such products shall be deemed to be the shop of the fabricator by whom they were purchased."

Less-Than-Carload Lots

Commercial Resolution No. 12

This resolution, adopted by the board Sept. 20, relates to deductions from base prices for products sold in less-than-carload lots. It concerns producers and jobbers in relation to purchasers. It follows:

"RESOLVED that if any member of the Code, or any jobber or other purchaser of any product for resale who shall have signed an agreement with any member of the Code in one of the forms annexed to Regulations No. 1 or Regulations No. 2 prescribed by the Board on Aug. 29, 1933, shall sell or contract to sell any product to any party in a less-than-carload lot and the all-rail published tariff less-than-carload freight rate on such product from the basing point on which the base price thereof shall be based to the place of delivery of such product to such party shall be more than twenty-five cents (25c) per hundred weight greater than the all-rail published tariff carload freight rate on such product from such basing point to such place of delivery, such member or such jobber or purchaser for resale, as the case may be, may allow to such party a deduction from the base price of such product at a rate which shall be not greater than the difference between (a) the all-rail published tariff less-than-carload freight rate on such product from such basing point to such place of delivery and (b) the all-rail published tariff carload freight rate on such product from such basing point to such place of delivery plus twenty-five cents (25c) per hundred weight on such product."

Delivered Detroit, Prices

Commercial Resolution No. 13

This resolution, adopted by the board Sept. 20, authorizes certain deductions in the base prices of certain products sold for delivery in or about Detroit. It follows:

"RESOLVED that any member of the Code may allow in respect of any of the products hereinafter specified which it shall sell or contract to sell for delivery to any purchaser at any of the places hereinafter described for the use of such purchaser a deduction from the then published base price of such member for such product not exceeding the respective amounts hereinafter specified;

"(a) On alloy steel bars (hot rolled and cold finished), hot rolled carbon steel bars (merchant steel and concrete reinforcing), and blooms, billets and slabs (alloy and carbon), for delivery within the switching limits of the City of Detroit, in the State of Michigan, a deduction not exceeding an amount that shall be Three dollars ($3) per ton, net or gross, as the case may be, less than the all-rail published tariff carload freight charges otherwise chargeable thereon pursuant to the provisions of Section 4 of Schedule E of the Code from the basing point on which such base price is based to said City of Detroit;

"(b) On hot rolled alloy steel bars, hot rolled carbon steel bars (merchant steel and concrete reinforcing), and blooms, billets and slabs (alloy and carbon), for delivery at any place in the State of Michigan outside the switching limits of the City of Detroit to which the all-rail published tariff carload freight rate thereon from Pittsburgh, Pennsylvania, shall be not greater than thirty-one cents (31c) per hundred weight prior to October 1, 1933, or twenty-nine cents (29c) per hundred weight on and after said date, a deduction not exceeding an amount that shall be Four dollars ($4) per ton, net or gross, as the case may be, less than the all-rail published tariff carload freight charges otherwise chargeable thereon pursuant to the provisions of said Section 4 from the basing point on which such base

price is based to such place of delivery;

"(c) On cold finished alloy steel bars for delivery at any place in the State of Michigan outside the switching limits of the City of Detroit to which the all-rail published tariff carload freight rate thereon from Pittsburgh, Pennsylvania, shall be not greater than thirty-three cents (33c) per hundred weight prior to October 1, 1933, or thirty-one cents (31c) per hundred weight on and after said date, a deduction not exceeding an amount that shall be Four dollars ($4) per net ton less than the all-rail published tariff carload freight charges otherwise chargeable thereon pursuant to the provisions of said Section 4 from the basing point on which such base price is based to such place of delivery.

"(d) On sheets, cold finished carbon steel bars and hot rolled strip steel for delivery within the switching limits of the City of Detroit, in the State of Michigan, a deduction not exceeding an amount that shall be Four dollars ($4) per net ton less than the all-rail published tariff carload freight charges otherwise chargeable thereon pursuant to the provisions of said Section 4 from the basing point on which such base price is based to said City of Detroit; and

"(e) On sheets, cold finished carbon steel bars and hot rolled strip steel for delivery at any place in the State of Michigan outside the switching limits of the City of Detroit to which the all-rail published tariff carload freight rate thereon from Pittsburgh, Pennsylvania, shall be not greater than thirty-three cents (33c) per hundred weight prior to October 1, 1933, or thirty-one cents (31c) per hundred weight on and after said date, a deduction not exceeding an amount that shall be Five dollars ($5) per net ton less than the all-rail published tariff carload freight charges otherwise chargeable thereon pursuant to the provisions of said Section 4 from the basing point on which such base price is based to such place of delivery."

Carbon and Alloy Bars

Commercial Resolution No. 14

This resolution, adopted by the board Sept. 20, recognizes the validity of certain quotations on cold finished carbon and alloy bars which producers had outstanding until Oct. 1 1933. It follows:

"RESOLVED that any member of the Code which, at the effective date of the Code, had outstanding any quotation of any price for any cold finished carbon and alloy bars which by its terms was stated to be good until Oct. 1, 1933, may allow a deduction from the published base price of such member for such bars in respect of any shipment thereof to any purchaser to whom such quotation was given which shall have been made on or before Oct. 15, 1933, and which shall have been ordered by the purchaser thereof in reliance on such quotation on or before Sept. 30, 1933, in an amount which shall not be greater than the amount by which the delivered price otherwise chargeable by such member for such bars under the Code shall exceed the delivered price of such bars to such purchaser pursuant to such quotation."

Slack Barrel Hoops

Commercial Resolution No. 15

This resolution, adopted by the board Sept. 20, permits deductions from present base prices of slack barrel hoops in cases where producers had lower quotations outstanding. It follows:

"RESOLVED that any members of the Code, which at the effective date of the Code had outstanding any quotation of any price for slack barrel hoops which by its terms was stated to be good until Jan. 1, 1934, may allow a deduction from the published base price of such member for such hoops in respect of any shipment thereof to any purchaser to whom such quotation was given which shall have been made on or before Dec. 31, 1933, and which shall have been ordered by the purchaser thereof in reliance on such quotation on or before Dec. 15, 1933, in an amount which shall not be greater than the amount by which the delivered price otherwise chargeable by such member for such hoops under the Code shall exceed the delivered price of such hoops to such purchaser pursuant to such quotation."

Delivery by Truck

Commercial Resolution No. 16

This resolution, adopted by the board Sept. 20, deals with instances where purchasers require delivery by truck at places that cannot be reached by all-rail transportation. It follows:

"RESOLVED that in any case in which any purchaser of any product shall require delivery thereof at a place which is not located within the switching limits of any city or town and at which delivery thereof cannot be made by all-rail transportation and delivery thereof at such place shall be made by truck, the member of the Code which shall sell or contract for the sale of such product to such purchaser for delivery at such place shall add to the delivered price of such product otherwise chargeable pursuant to the provisions of said Section 4 for delivery at the nearest point to such place at which such product could be delivered by all-rail transportation an amount which shall be not less than one dollar ($1) per ton of such product so delivered."

Tool Steel Jobbers

Commercial Resolution No. 17

This resolution, adopted by the board Sept. 20, defines the general qualifications of jobbers of tool steel. It follows:

"RESOLVED that anything in Regulations No. 1 prescribed by the Board of Directors Aug. 29, 1933, to the contrary notwithstanding, if any person, firm, association or corporation shall qualify as a jobber of tool steel in all respects except that it does not as a rule purchase such tool steel in carload lots, such person, firm, association or corporation shall nevertheless be deemed to be a jobber in respect of tool steel for all purposes of Section 4 of Schedule E of the Code and of said Regulations No. 1."

Sales to Government

Commercial Resolution No. 19

This resolution, adopted by the board Sept. 20, relates to the sale of products to the United States government, or its agencies. It refers to Section 6 of Schedule E and Schedule G of the Code respecting maximum periods of free credit and maximum rates of discount for early payment. It follows:

"RESOLVED that the provisions of Section 6 of Schedule E and of Schedule G of the Code shall not be deemed to apply to any sale or contract for the sale of any product to the Government of the United States of America or to any agency thereof in any case in which such government or agency shall pursuant to law impose terms of payment other than those prescribed in said Section 6 or in said Schedule G; *provided, however*, that no member of the Code shall allow to such Government or any agency thereof more favorable terms of payment than those which shall be prescribed by such Government or agency pursuant to law."

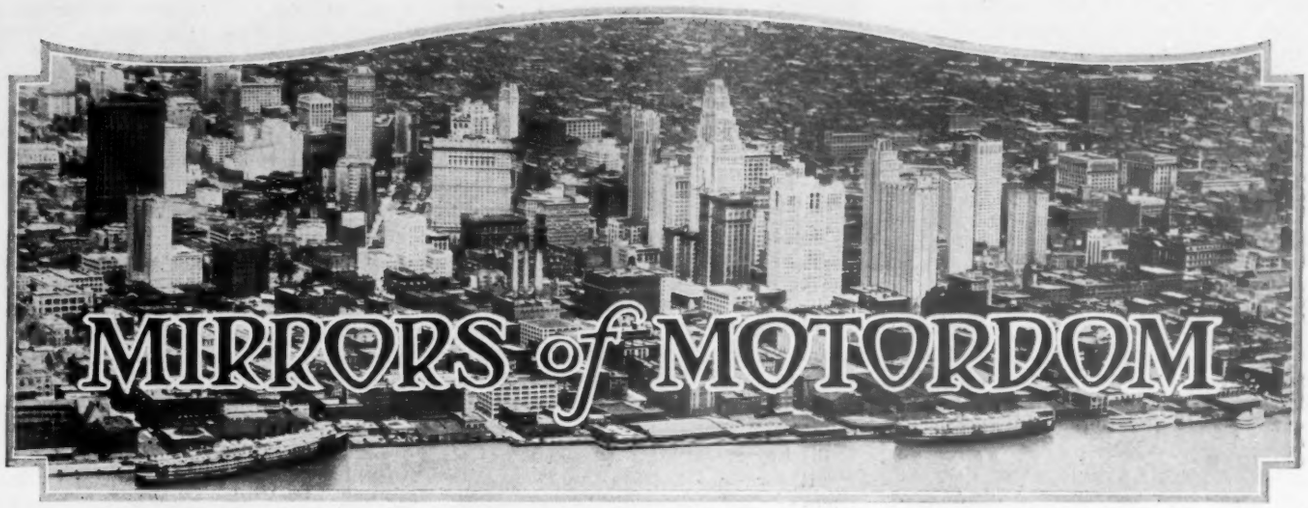
Switching Charges

Commercial Resolution No. 20

This resolution, adopted by the board Sept. 20, takes note of the great diversity in switching charges at various basing points and the practical impossibility in most cases for members to ascertain in advance of actual shipment the correct published tariff charges. It provides for arbitrary averages, which after investigation were determined to be fair. It follows:

"RESOLVED that, for the purposes of the provisions of Section 4 of Schedule E of the Code, the requirement to add the appropriate switching charges to the base price of any product in making delivery thereof at any basing point other than a Gulf port or Pacific Coast port shall be deemed to have been satisfied, until the Board of Directors shall otherwise determine, if, in determining the delivered price of such product at such basing point, in lieu of the actual published tariff switching charges, the member of the Code shipping such product for delivery at such basing point shall use the arbi-

(*Please turn to Page* 71)



Few New Models Till Shows

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Differentials Quiet Buyers

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Box-like Hoods New Style

DETROIT

STUDEBAKER and Nash this week start the parade of new automobile models for 1934. Dealers have had their pre-views at the factories over the past two weeks, and formal announcements and dealer showings are scheduled to begin in a few days. October production schedules of both makers are about 8000 units.

With several exceptions, Detroit will not join the parade much before January showtime. Packard, of course, already is out. Buick, now making final assemblies of its 1933 line, will be first of General Motors to show, but probably not for a month.

Chevrolet, some of whose departments are beginning to slow down, will continue to assemble into November. Last year it introduced its new series early in December, but Dec. 15 appears to be the upset date for this year.

Plymouth brought out its first 1933 models early in November last year, but has just advised its dealers that the present line will not be supplanted until showtime or just before. A new DeSoto prior to the shows, however, is a possibility.

Ford's manufacturing schedule tapers off sharply in the last half of October, presaging changes in the present V-8. But dealers probably will be given ample time in which to move their present stocks, which are substantial despite recent improvement in sales.

Other makers are expected to defer their announcements until the New York show. Present models are going good—remarkably good considering the generally easier tendency in business. Codes are another reason, the industry having one of its own to digest in addition to assimilating codes of its suppliers.

EMPHASIZING streamlining of bodies, the new Nash and Studebaker models strike the keynote for 1934. Neither, however, is as radical as some designs to be brought out by Detroit manufacturers. There are three series of Studebakers, the lowest-price one being about $100 higher than the class of the former Rockne, a name that disappears.

Test cars seen in the vicinity of Detroit, and presumably the product of Detroit body divisions, indicate a complete redesign of the front end. In general, when viewed head-on the front appears to be a single piece of sheet steel, without a break from the outside of the left fender to the outside of the right one. The radiator is recessed in the center, usually without a grill and affording a color contrast.

There is no break between fenders and radiator shell, and the headlamps are drawn out of the fenders and located just above the bumper in some cases. Front brackets have entirely disappeared. There is a moderate upward slope to the front.

At the top of what would be the radiator shell the two fenders fall away to the running boards (one model will have steps), but the hood continues wide and practically flat to the windshield. The hood is as wide as the front, minus the two fenders. Hood sides have practically disappeared. To an extent, these designs give much the same appearance as the rear decks of roadsters or coupes, with a center opening for the radiator.

This design is variously attributed to Chrysler and Fisher, but is believed to be generally representative of what body engineers are doing for 1934. In the case of the new Plymouth, the roof line will describe an arc, windows will be broader than they are high and the spare tire will be practically recessed in the rear. Chrysler still will not go to fender valances, except in the rear on some lines, but the front fenders will hug the wheels closely.

The development of the automatic gearshift happily coincides with the trend toward the teardrop body. This type bulges at the front and tapers at the rear. The front compartment being cleared of the gearshift lever and the emergency brake lever being located at the driver's left, the seating arrangement is three in the front and two in the rear. Since the public has to be educated up to radical designs, the industry will be about two years in making the transition.

Beginning with 1934 models, radio is regarded as an integral part of a car and not as an accessory. On many instrument boards the radio dial will have space along with speedometer, oil and other gages. The deluxe Essex Terraplanes go down in history as being the first to offer radio as standard equipment.

IN RETURNING late last week to a 40-hour week, after a brief trial of a 32-hour basis, Henry Ford is doing the same as his competitors.

The automobile code specifies an average of 35 hours a week from Sept. 1 to Dec. 31, and the general plan is to operate rather fully at this time and average down at the close of the year, when the changeover to new models is made.

Mr. Ford is represented as still being willing to conform to maximum hours and minimum wages specified in the automobile code but to resent any intrusion of his books. Most other automobile manufacturers in Detroit wish they could be as independent. It is noteworthy that Washington is avoiding a direct test, insisting that complaints of NRA violations be forwarded to it and not handled locally.

Fully as much as the automobile

code, Mr. Ford objects to the steel code and the higher prices it entails. The threat has been made that the Ford steelworks, with its two blast furnaces and ten open-hearth steel furnaces, will be reopened. It still is believed that the costs at Fordson are higher than the market, after giving effect to the advances, but Mr. Ford frequently values a principle more than a dollar.

The Ford steelworks could supply all of the requirements for the rear axle and housing, driveshaft, springs, wire for spokes, wide flats for the side rails and cross members of the frame—in fact, all carbon and alloy bar specifications, but no sheets or wide strip. The steelworks was closed when daily assemblies at Fordson were 4000 a day. The present production is 2000 to 2500 daily.

It was with uncanny but predetermined accuracy that a strike was called last week at tool and die shops in Detroit, Flint and Pontiac. At this season the emphasis is upon dies for new models, rather than production. A delay of several weeks would not cause much delay on new models, but a settlement of the strike this week was expected.

Organizers for the American Federation of Labor and for radical organizations are active here. Because of the prominence of the Ford name, strike efforts seem to be directed at Ford company operations. No one has ever dictated to Mr. Ford on labor.

SOME daily newspapers have been speculating on a grand gesture by Mr. Ford to counteract any adverse reaction to his attitude on NRA—a gesture in the nature of a new low-price car, to sell at about $400, yield 25 to 30 miles on a gallon of gas, and to be sold at cost for a year or more.

Always with the reservation that a new policy may be the decision of Mr. Ford at any minute, there are no indications at Fordson of any such gesture. The specifications fit the type of car whose design has long since been completed and for which some parts have been accumulated and some material placed but never released.

It has been repeatedly stated in this column that when Mr. Ford is convinced that the depression is over he will offer an extremely low-price car especially for the agricultural and small town buyer—the field in which he made his reputation and money. At the moment, it appears that he will revise his present V-8 between now and January showtime, among other things going to the new coil springs both front and rear. But a surprise move is always possible.

Those who have speculated that Mr. Ford would do something for the country by offering a car at cost have been indefinite, indelicate—and probably inaccurate. The last thing any Ford buyer would want is a Ford at cost—providing all overhead is figured in.

In 1932 the Ford company registered 258,929 passenger cars. It probably is a generous estimate to place total production in the year, including trucks, at 325,000 units. The deficit of the Ford company in 1932 was reported as $79,247,699. In other words, the cost of every Ford car over and above its sale price was $243.83!

Mr. Ford has leased convention hall, the largest display space in Detroit, for an industrial show late in October. All suppliers will be invited to participate, with generous representation by the iron and steel industry. An announcement of this will be made in about a week. In Cleveland recently a somewhat similar exposition was staged by dealers.

AUTOMOTIVE buyers, harrassed by the new steel code regulations, have been partly, but not entirely, mollified by restoration of certain differentials.

On hot-rolled bars and small shapes the delivered price in the Detroit switching area is the Pittsburgh base plus 15 cents. On sheets, strip and cold-finished bars the differential is 20 cents. Outside of Detroit and within the 29-cent freight rate area of Michigan, the differentials are $1 per ton higher than in Detroit.

With bars still 1.60c, Pittsburgh, up to last Friday night, the delivered price at which most fourth quarter material will move is 1.75c. Considering that the carload rate from Pittsburgh to Detroit, with the surcharge removed, is 26½ cents, the net price to the mill is 1.48½c.

New business taken after last Friday is to be based on 1.75c, Pittsburgh, for bars and 1.70c for plates and shapes, plus the differentials. Strip is 1.75c for hot and 2.40c for cold-rolled, and cold-finished 1.82½c to 1.95c, according to quantity.

With the surcharge removed, the new freight rates to Detroit are 26½c from Pittsburgh, 20c from Cleveland, 23½c from Buffalo and 25c from Chicago.

Prior to the expiration of old contracts, specifying for heavy finished steel was of tremendous proportions, and it will probably be impossible for mills to ship prior to the Oct. 15 deadline. Buyers, however, will get the steel.

One automotive user alone has released sufficient for 600 carloads. More than one automobile manufacturer is financing his leading partsmakers to stock. By Oct. 15, more steel will be under cover in Detroit than in any time in history.

The result is that September releases and shipments were extremely heavy, October shipments will be large but fresh buying light, November will see some releases against requirements for new models but with many needs met from stock.

CHRYSLER is using stainless steel for moldings and a modernistic treatment of the outer walls of its new $350,000 administration building and showroom at the DeSoto and Chrysler divisions. . . . Essex terraplanes which come equipped with radio are also equiped with a new-style generator, which charges at 22 to 23 amperes, compared with a normal 16 to 18 amperes, but has a special forced ventilating system and a device which reduces the charging rate 60 per cent when the battery is full. . . . Four Wheel Drive Auto Co., Clintonville, Wis., has developed a high-speed rail bus which differs from most designs in that each axle is driven by a separate motor through a separate three speed transmission. Controls to the individual drives are synchronized. Wheels are of the rubber insert type . . . . Pontiac is not an all-strip steel car, as recently reported; wide sheets from jobbing mills are used for some body parts.

Steel's Uses in Brewing Displayed at Convention

Exposition of brewing equipment manufactuers, held for the first time since before prohibition at Chicago last week, attracted 237 exhibitors. The widespread use of steel in the brewing industry was evidenced in the many types of machinery on display, including bottle and barrel washing equipment, bottling, pasteurizing and labeling units as well as miscellaneous machinery.

Steel barrel manufacturers exhibiting their products included Bossert Corp., Buhl Stamping Co., Ingersoll Steel & Disc Co., Murray Corp., National Enameling & Stamping Co., Pressed Steel Tank Co., A. O. Smith Corp., Solar-Sturges Mfg. Co., Thermo Barrel Corp. and Truscon Steel Co.

Republic Steel Corp. and subsidiary companies of the United States Steel Corp. displayed samples of stainless steel for brewery use. Lamson Co. demonstrated a new type of tubular conveying equipment.

Samples of brewery tanks were shown by the Pfaudler Co., Chicago Steel Tank Co. and Alloy Products Co. Among other exhibitors were the Cutler-Hammer Inc., Blaw Knox Co., Freyn Engineering Co., Louis Allis Co., Bristol Co. and Stevens Metal Products Co.

Flame Cutting and Machining Gaining Wide Acceptance

INCREASED use of various applications of flame cutting and flame machining in the steel industry was one of the recent important developments reported to the International Acetylene association, holding its thirty-fourth annual convention in Chicago last week. The annual review of the oxyacetylene committee, headed by J. J. Crowe, Air Reduction Sales Co., New York, commented on this development as follows:

"Shape cut steel parts are coming more and more into use in the fabrication of machine bases and other machine parts; the importance of this spread in the use of oxyacetylene cutting is illustrated by the fact that codes for cutting and welding in the manufacture of machinery are being formulated by some of the regulatory bodies at the present time. Many shops have been set up to produce shape-cut parts which can be made to order for outside purchasers. Deseaming of billets and slabs has been established as standard practice in many important steel mills. The increased activity in the steel industry should under normal conditions further the acceptance of these newly developed oxyacetylene cutting processes."

Restoring Brewery Equipment

Rehabilitation of equipment in various industries by means of oxyacetyene welding and cutting also was mentioned. The brewing industry has made extensive use of this agency in restoring old equipment, this subject being discussed more in detail in a paper by F. W. Rabe, assistant chief engineer, Anheuser-Busch Inc., St. Louis.

The report of the oxyacetyene committee took the form of a booklet of 106 pages and was made up principally of two sections, one on oxyacetylene welding applications; the second on oxyacetylene cutting applications. The section on welding codes has been continued and the section on specifications for ferrous and nonferrous materials has been enlarged to include specifications of the Society of Automotive Engineers.

Last year the committee included in its report new sections on weld tests, welding codes, metal material specifications and a table of oxyacetylene welding applications. Because of the wide interest aroused in this table, it was decided this year to enlarge and explain it more fully as well as to prepare a similar chart for cutting.

In his address at the opening session, Retiring President E. J. Hayden, Linde Air Products Co., Chicago, emphasized the importance of technical developments of the past 15 years, particularly in quality of gas, in equipment and apparatus, and in filler materials. He also outlined efforts of the association in aiding the recent formation of the National Oxygen and Acetylene association for the purpose of adopting a code of fair competition for the oxyacetylene industry.

Bennett Chapple, vice president, American Rolling Mill Co., Middletown, O., spoke of the changing trends accompanying effects on industry. Discussing "A Century of Progress in Acetylene," John M. Morehead, New York, gave a comprehensive review of the various events leading up to the present widespread use of this product in welding and cutting work.

Present Industrial Drama

"The Prosperity Process," an industrial drama in four acts which first was presented at the associations convention in Philadelphia last year, was given again at the Chicago meeting, attracting a large audience at two performances. The cast, taken from members of the association, depicted the success of a company in utilizing the oxyacetylene process to accept and fill a large order profitably.

The evening of the first performance also was the occasion for the presentation of the Morehead medal, an annual award established in 1922 by John M. Morehead in honor of his father, the late James Turner Morehead, who in 1892 sponsored the experiments which led to the discovery of the electric furnace method of producing calcium carbide. The 1933 recipient of the medal was the Rev. Julius A. Nieuwland, professor of organic chemistry, University of Notre Dame, Notre Dame, Ind., in recognition of his contributions to the practical use of acetylene in synthetic organic chemistry as well as of his exhaustive research and studies as described in an early treatise, entitled "Some Reactions of Acetylene."

Various uses for oxyacetylene welding and cutting by railroads were described in several technical papers. Reconditioning of rail ends was discussed by J. C. Hartley, assistant engineer, Pennsylvania railroad, Altoona, Pa. A large saving in costs by building up of rail ends through welding as compared with the cropping process was reported and the method employed was described. "Heat Treatment by the Oxyacetylene Process" was presented by J. H. Critchett, vice president, Union Carbide & Carbon Research Laboratories, Inc., New York, while practice in scrapping of locomotives and cars was discussed by A. L. Prentice, manager, scrap and reclamation department, New York Central Railroad, Cleveland.

Welded construction is coming into greater prominence in building of steel plant equipment, it was pointed out by H. G. Marsh, Carnegie Steel Co., Pittsburgh. Its use also is being applied to many varieties of machines in in the industry and not to any one unit alone. Examples of welded rolled steel equipment which has replaced former types were described, including open-hearth ladles, gear cases, mill housings, blast furnace tuyere jackets, charging machines, cinder cars, gate valves, pinion housings, shears and reversing rolling mill motors.

Acetylene and Oxygen in education and research were discussed at one session by several papers. G. O. Carter, consulting engineer, Linde Air Products Co., New York, stressed the importance of the technician's and welder's ingenuity in the use of the welding and cutting torch.

Award Bethlehem Tunnel Castings

BETHLEHEM STEEL CO. has been awarded 51,800 tons of cast iron segments and special castings for the Midtown Hudson river tunnel, Manhattan-Weehawken, N. J., to be built by the Port of New York authority. The contract requires 48,500 tons of cast iron segments and 3300 tons of cast steel segments. Bidders follow:

Bethlehem Steel Corp., $2,358,150; United States Pipe & Foundry Co., $2,591,900; Bartlett, Hayward & Co., $2,594,405; Continental Roll & Steel Foundry Co., $2,636,750. The figures were within the engineers' private estimates.

The contract requires that at least 200 rings of lining be complete and ready for shipment on March 1, 1934, and thereafter at a uniform rate of not less than 200 rings a month, and that all segments and special castings shall be completed by Jan. 1, 1935. Delivery of all of the castings may extend over a period of 27 months.

The lining will be built of rings generally 30 inches wide with each ring made up of 14 segments and a key segment, all properly bolted together in place. Approximately 25,000 tons of pig iron, and the remainder cast iron scrap, will be required to meet the 51,800-ton contract. About 2000 tons of bolts and nuts will be needed.

Strikes Offset Specifying, Lowering Steel Rate to 38%

HAD it not been for declines in the Pittsburgh and Wheeling districts, occasioned by strikes, the national steel average would have held unchanged last week at 40 per cent, instead of dropping 2 points to 38.

This week's rate is again complicated by the unsettled labor situation; otherwise, heavy specifications against expiring contracts would prompt an increase.

Last week the Youngstown rate was up 6 points to 54 per cent, and Chicago up 4 points to 48 per cent. Cleveland was stationary at 54 per cent, and Buffalo at 48. Declines from 9½ to 16 points were registered in the Wheeling, New England, Birmingham and Detroit districts.

Details for the districts follow:

Pittsburgh

Steel ingot production leveled off last week at 30 per cent in the Pittsburgh district. It is likely that owing to a bulge of steel orders being driven in by higher prices effective with Oct. 2, steel operations will show expansion soon, although the rate for this week is not calculated to be much above 30 or 31 per cent.

Seventeen out of 53 steelworks blast furnaces are on, 9 of 32 being operated by Carnegie Steel Co., 4 out of 11 by Jones & Laughlin Steel Corp., and one each out of two by Pittsburgh Steel Co. and Pittsburgh Crucible Steel Co. National Tube Co. runs one of four at Monongahela, Pa., and American Steel & Wire Co. one of two at Donora, Pa.

Chicago

While the trend in steelmaking schedules varied at individual plants last week, the average for the district increased 4 points to 48 per cent, matching the gain of the previous week. Blast furnace operations also have been increased through the addition of several stacks previously banked, ten of the district's 36 steelworks furnaces now being in blast. Considerable uncertainty attends the outlook for future schedules.

Cleveland

Steelworks operations in the Cleveland-Lorain district averaged 54 per cent in the week ended Sept. 30, although there was some change in the lineup of active open hearths. Otis Steel Co. lighted another unit, now operating all of its eight, mainly to provide for capacity operations in its sheet mills. The National Tube Co., Lorain, took off one unit, operating seven. Corrigan, McKinney Steel Co. continued with six.

Detroit

Great Lakes division of the National Steel Corp. has dropped one of its six active open-hearth furnaces, lowering the rate for the Detroit area from 55 per cent to 45½. The two new Great Lakes open hearths are rapidly nearing completion. Ford Motor Co. threatens to light some of its open hearths if steel prices go higher.

Eastern Pennsylvania

Steel production on the central eastern seaboard averaged 31 to 32 per cent in the week ended Sept. 30, a decline of 4 points. Recent fourth quarter contracting is not yet reflected.

Wheeling

Steelmaking schedules dropped off 16 points last week to an average of 56 per cent in this district. From Sept. 27 until the end of the week, when a strike at the Weirton Steel Co. plant suspended open-hearth operations there, only 14 of 37 open hearths were operating in the district, or at 38 per cent. The early part of the week, or up until Sept. 27, steel ingot schedules had been at 72 per cent, average for the week therefore having been 56 per cent.

Buffalo

Steelworks operations in this district will be at the rate of 50 per cent this week, after having reached that point late last week, when the average for the week was 48 per cent.

New England

Steelmaking operations, which averaged 86 per cent in the week ended Sept. 23, dipped as low as 70 per cent last week but rebounded sufficiently to give last week an average of 75 per cent.

Birmingham

Steel ingot operations declined 16 points to 34 per cent in the Birmingham-Gadsden district, the cut being mainly at Fairfield. Operation of the steel mill at Ensley for a few days by the Tennessee Coal, Iron & Railroad Co. does not require any great amount of ingots and these will be furnished from Fairfield. Fourth quarter operations indicate improvement, as rail orders are being booked.

Youngstown

Steelmaking operations averaged 54 per cent, last week a gain of 6 points. The prospect for this week was a 54-55 per cent schedule. Mill managers see no sharp change for at least two weeks. The Republic Steel Corp. leads in the valley with 17 out of 23 open hearths melting.

Operating Rate of the Steel Industry, by Weeks

All figures except monthly open-hearth and bessemer totals of American Iron and Steel institute are percentages, based on reports from Pittsburgh, Chicago, Youngstown, eastern Pennsylvania, Cleveland, Birmingham, Buffalo, Wheeling, New England, St. Louis, Lorain, Detroit districts. Weeks end Saturday. STEEL's weekly estimates take into account only actual available capacity, which is less than Institute's total.

1932	1st Week	2nd Week	3rd Week	4th Week	5th Week	STEEL's Average	Institute's Monthly Total tons	Institute's Monthly Average
Jan.....	22	25	26	27	28.5	25.7	1,484,991	26.41
Feb.....	28.5	27	25	25	....	26.4	1,481,253	27.40
March....	25	25.5	24.5	23	....	24.5	1,433,337	24.55
April.....	23	22	22	23	24	22.8	1,259,629	22.40
May.....	24	24	25.5	23	....	24.1	1,125,243	20.01
June.....	21	17	17	17	....	18.0	912,757	16.23
July.....	14.5	12	15.5	16.5	16.5	15.0	806,722	14.92
Aug.....	14.5	14.5	15.5	14.5	....	14.7	846,730	14.50
Sept.....	13.5	15.5	15	17	....	15.3	991,858	17.64
Oct.....	18	19	19.5	19.5	19.5	19.1	1,087,058	19.33
Nov.....	21	21	19	17.5	....	19.6	1,032,221	18.36
Dec.....	16	15	14	12	13	14.0	861,034	15.31
1933								
Jan.....	15.5	17	18	19	....	17.4	1,030,075	18.23
Feb.....	19	19	19	17	....	18.5	1,086,867	20.83
March....	15	13.5	15	14	15.5	14.6	909,886	15.50
April.....	17.5	20.5	25	29	....	23.0	1,362,856	25.08
May.....	33	36	40	43	....	38.0	2,001,991	34.11
June.....	47	48	49	51	54	49.8	2,597,517	45.96
July.....	55	57	57	55	....	55.8	3,203,810	58.95
August....	54	54	51	48	45	50.6	2,900,611	49.42
Sept.....	42	41	40	38	....	40.9	.....	.....

WINDOWS OF WASHINGTON

Politics' Effect on Business

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Strikes May React on Labor

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It's Purse vs. Pride in South

WASHINGTON

NRA having failed to supply the desired quick impulse to recovery, the President has been compelled to re-form his line of battle against the depression. What will be the effect on business for the remainder of the year?

Notwithstanding numerous reports, there is no convincing evidence of another big offensive on the original scale of NRA. Washington, including the President, appears persuaded that mass psychology, boycotts and the thumbscrew are ineffective in peacetime against a disjointed economic situation. For the present, at least, the new strategy is a series of forays to pinch off the annoying salients of the depression.

Reopening of banks and release of frozen deposits; reorganization of the treasury to make it more responsive to new banking conditions; resumption of trade with Russia; a new deal in PWA to get action before cold weather sets in; stabilization of the dollar; raising commodity prices; extension of credit through normal banking channels and the issuance of currency against government bonds purchased in the open market—these are the tactics.

Aimed at correcting conditions created by the depression, these measures nevertheless are more normal and assuring than the Johnson campaign. Already there is some return of the confidence and vigor inspired by the President in the early spring and summer—and there would be more if labor were better in hand. This quarter, at least, the irritations of NRA will not be repeated.

Labor day, a traditional fuse lighting a fall upturn in business, is now a month past and the trend in many manufacturing industries, including iron and steel, automobile and rubber, has been down rather than up. Even in lush years, early December begins pointing toward the holiday and inventory period. Thus, any pronounced improvement in business must be packed into two months—October and November.

Specific reports on iron and steel indicate a fairly good October, due largely to the rolling of specifications for material placed before the fourth quarter price advance; a mediocre November due to a seasonal letdown in automobiles and the accumulation of consumers' inventories in October; a December that is obscure but likely to be indifferent unless a further rise in prices is a spur.

The trend in commodity prices, Washington believes, is definitely upward and practically every commodity is a "buy" at current prices. The heavier lines may be an exception to this generalization because Washington still believes that these commodities, including iron and steel, were not liquidated to the extent that the agricultural and so-called finishing industries were. The President's pressure on the price of steel rails is indicative of this attitude.

Over the quarter, labor will increasingly get out of control and strikes and their accompanying interruptions of business will become more numerous. Probably no business legislation in the history of the nation has fomented so much class trouble as the recovery act, and the failure of NRA, which is really the direct result of labor's militancy, will be used as ammunition to foment disturbances. The labor situation is bad, and growing worse.

The appointment of Minister MacMurray to Latvia, the Lindberghs' flight to and in Russia, the pressure of groups which have the ear of the administration, all point to early trade with the Soviets. Diplomatic recognition is not essential, but would help. Credit is the touchstone; every day promoters knock on the door of RFC with some plan which lacks only one factor—RFC credit.

Transportation costs will be no higher and may be lower. About Nov. 1. the present 3.6-cent passenger fare will go to about 2 cents for the round trip, and the 50 per cent surcharge on Pullman fares will be removed. The freight surcharge expired Sept. 30.

There are some in Washington who believe an adjustment downward in freight rates is necessary both to meet the competition of the highways and to place transportation in line with other commodities. The railroads and the ICC hope that the adjustment will come through a lift in other prices to the level of transportation.

Any forecast as to the volume of business for the fourth quarter is subject to the hazard of inflation. Some form of it is certain and the sequel will be some measure of flight from currency to commodities. A surprising volume of commodities, including tin, is believed to have been purchased by individuals as a means of hoarding. A warehouse certificate for a commodity may be more stable than government bonds. Some consumers of iron and steel regard their inventories as insurance against inflation. Thus, over night a stagnant production situation late in the quarter might be galvanized into heavy production for inventories.

POLITICALLY, there will be action aplenty over this quarter. Every move of the administration to energize business must be tempered by the realization that a radical congress convenes in three and one half months.

When NRA is referred to as a failure it is in the light of not having

met the specification of re-employing 7,000,000 persons by early fall and lifting the country speedily out of depression. The industrial codes will remain, a mixture of evil as regards the labor situation and of good as to permitting industries to rationalize their competitive methods and regain a remunerative basis.

The strategy of politics will not permit an open retreat on this highly-touted program, and in a broad sense it may be said that NRA was devised to save the nation and now inflation will be adopted to save NRA.

It begins to look as though the depression were insoluble in any synthetic fluid and that only time and the return to sound economics will dissolve it. It is surprising how often now the observation is made in Washington that perhaps after all Mr. Hoover accomplished all that was possible and that the new President has no more a magic wand than his predecessor, except for the gift of instilling confidence.

Any discussion of inflation needs to be prefaced by an understanding of the situation in congress. It were as though congress, at the special session, brandished an axe dangerously and the President persuaded congress to turn the axe over to him on the promise that it would be used if necessary.

If business is not conclusively better by the time congress convenes in January it will assume that the President has not used the axe as agreed and will insist on its return. Business will be vitally interested in where the chips fly.

The key point of the President's legislative relations with congress thus far is that he always has "a plan." In a political manner he has kept congress on the defensive by submitting "a plan" and promptly going before the country by radio to rally it to his support.

Unquestionably, the President's message to congress in January will be another assumption of the offensive. One phase of this plan will refer to the banking situation. It is conceded that the administration did a remarkable emergency job with the banks, but has done little of a permanent nature since.

Labor is inseparable from politics. There is the possibility of a public reaction against labor striking so shortly after it has been re-employed, and at advanced wage rates. This may cause the President to walk the tightrope betwen the American Federation of Labor and what might be termed "the public".

The American Federation, incidentally, will shortly become better intrenched in the department of labor when Edward F. McGrady, its premier lobbyist, becomes assistant secretary to Miss Perkins.

At present, Mr. McGrady is labor advisor to General Johnson, and no one knows better than he the provisions of the recovery act, for the collective bargaining provision was the high spot of his legislative career.

When the bill was in conference, Mr. McGrady sat at the entrance to the conference room. Senators and representatives struggling to reconcile the house and senate versions knew he was there; so did every congressman who entered the room to consult with the committee. Industry had no comparable watchdog, and lost.

ONE reason why the railroads have been reluctant to solicit federal loans for purchasing track material and rolling stock is that they have learned how hard the role of the debtor is—especially when the government is the creditor.

The string to every recent RFC loan is that the borrower heeds every suggestion for economy, including reductions of salaries. The recent Denver & Rio Grande loans of $950,000 was contingent on the salary of its president being lowered from $50,000 to $36,000.

Up to ten days ago only the Pennsylvania railroad stood out against the edict of Railroad Co-ordinator Eastman that $60,000 be the top for executives. Then W. W. Atterbury, through his board of directors, acceded and pared his annual rate from $109,000 to $60,000.

Specific pressure was brought to bear on the Missouri Pacific railroad recently, and its president is now living on $40,000 a year instead of $85,000.

At one time the federal trade commission was considering making an investigation of salaries of executives of companies listed on the New York stock exchange, which would have included many iron and steel producers.

It is a bad "break" for steel that Secretary of the Interior Ickes is the government official who probably will open bids on rails to be financed by the public works administration. In handling bids for cement for Boulder (nee Hoover) dam, Secretary Ickes bore down heavily on the industry. If the rail bids do not undercut the present market of $40 considerably, there is a chance that the matter of costs—including salaries—will be probed.

SOUTHERN feelings have been abraded a remarkable number of times in Washington recently, considering that the government is in "friendly" hands.

Secretary of Labor Perkins was first to give offense when, to illustrate potential markets which could be cultivated to expedite recovery, she referred to shoes for southern children. The inference of a high percentage of barefootage was resented.

Then, shortly, Miss Perkins tore off the scab when she averred that it was of small benefit politically to dole out jobs to the South, since it was safely Democratic anyway.

It was bad enough for General Johnson to gloat over the abolition of child labor in the cotton industry as a major achievement of NRA, but for the President himself to reiterate it was to be wounded by a friend.

Nor is it forgotten that the cotton goods industry was singled out by the President, in his first radio address on NRA, as an example of vicious competition.

In every discussion of industrial codes under NRA, the South has been set apart as a region of low productivity and living costs, and hence entitled to a differential on wages. Typical of this, the minimum rates in the South are 25 and 27 cents, while most of the northern rates are 40 cents.

The South itself has contended for this differential, arguing that, for one thing, the climatic conditions which diminish personal efficiency also reduce the requirement for food and shelter. At the same time, accepting a lower rung on the industrial ladder does not go down well in the South.

A curious by-product of the new wage scales in the South is the effect on negroes. In some cases, the new rates are at such a level that several days constitute a week's work, and labor is more irregular. In other cases, employers can obtain white labor and at the same price prefer it to negro, aggravating unemployment in that class.

IF HE wanted to, James J. Davis, former secretary of labor and now a senator from Pennsylvania, could have a place with the Amalgamated Association of Iron, Steel and Tin Workers and help organize the steel industry. . . . The cast iron pressure pipe code has been set for hearing in Washington, Oct. 9. . . . Iron and steel scrap dealers are urging an immediate hearing on their code, as scrap prices are going down and labor costs have been doubled in some districts. . . . The national labor board, headed by Senator Wagner, is now willing that controversies be settled by local boards, but these boards must be subsidiaries of the national board and not local compliance committees of NRA. . . . The controversy between the National Association of Manufacturers and William Green, president of the American Federation of Labor, over the "closed" shop becomes academic in view of what is happening in the field.

Industrial Men in the Day's News

John W. O'Leary, President, Machinery and Allied Products Institute

AS an engineer, manufacturer, banker, foreign trade diplomat, he has had a wealth of business experience.

ASSOCIATED with many groups active in war-time work; later, president, United States Chamber of Commerce.

HE now directs a federation of trade bodies, with particular reference co-operation under NRA.

ENGINEER, manufacturer of steel products, and executive of national and international experience, John W. O'Leary, who recently was named president of the newly-formed Machinery and Allied Products institute, has had a diversified background during the more than 30 years of his business career.

In his new capacity he directs an organization which constitutes a federation of trade associations representing thousands of interests identified with the machinery and allied industries of the country, with particular reference to their activities under the industrial recovery program.

Mr. O'Leary maintains his headquarters in Chicago, his native city and the base of the greater portion of his business and industrial life. Born there in 1875, he attended the local public schools and Armour Institute of Technology.

Graduating from Cornell university in 1899 with the degree of mechanical engineer, he joined his father, Arthur J. O'Leary, in what now is Arthur J. O'Leary & Son Co., Chicago. The company, established in 1874, manufactures various iron and steel products, including bolts, rivets, building rods, forgings, etc. Made secretary and treasurer in 1904, Mr. O'Leary became vice president and treasurer following his father's death in 1923, continuing in those capacities since that time.

For a number of years he was active in banking affairs, serving as senior vice president and director of the Chicago Trust Co. 1919 to 1929. Shortly after being named president in 1929 he became president also of the old National Bank of the Republic, with which the Chicago Trust Co. was combined. On the subsequent formation of the Central Republic Bank & Trust Co., Mr. O'Leary was elected to the office of vice chairman of the board.

During the war he acted as chairman of the war council, Chicago association of commerce; member of the fuel administration board, state of Illinois; chairman of the metal trades group of the advisory committee, United States war labor policy board; and served with several other state and national war bodies. President of the Chicago association of commerce from 1916 to 1918, and of the chamber of commerce of the United States from 1925 to 1927, Mr. O'Leary was delegate from this country to the International chamber of commerce meeting in Brussels in 1925. He also represented this country abroad in 1927 as a delegate to the international economic conference at Geneva.

Mr. O'Leary's other industrial interests are evidenced by directorships held in the Chicago Great Western railroad. Advance-Rumely Co., La Porte, Ind.; Belden Mfg. Co., Chicago; Chicago Railways Co., Northwestern Terra Cotta Co. and others. His experience with trade association work has been gained from active identification with such bodies, Mr. O'Leary being a former president of the National Metal Trades association.

His club affiliations have been numerous in Chicago and elsewhere, including the Chicago Athletic, Commercial Economic, Union League, Chicago, Industrial, South Shore Country, Knollwood, Onwentsia, and Midday clubs of Chicago, Lotos club of New York, and Metropolitan club at Washington.

S. R. WILLOCK has been appointed Pittsburgh district sales manager for the Treadwell Engineering Co., Easton, Pa., with offices in the Farmers Bank building. Mr. Willock has had considerable experience in the rolling mill equipment industry, having been previously connected with the Mesta Machine Co., United Engineering & Foundry Co., Mackintosh-Hemphill Co., and Wellman Engineering Co.

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Robert B. Schenck, formerly chief metallurgist for Buick Motor Co., Flint, Mich., has been appointed metallurgical sales engineer for the Pittsburgh Crucible Steel Co., Pittsburgh. He was graduated from Lehigh university in 1910, following which he was employed four years in the Du-

quesne steelworks of Carnegie Steel Co., Pittsburgh. In 1915 he went with Buick as chief metallurgist and was employed in that capacity there until 1931.

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P. J. Flaherty, president, Johnson Bronze Co., New Castle, Pa., has been elected president of the Cast Bronze Bushing institute.

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Howard B. Book has been made manager of the Oklahoma City, Okla., branch office of Reed Roller Bit Co., Houston, Tex., manufacturers of oil field drilling tools.

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Charles F. Norton, former vice president and general manager of the Howell Electric Motors Co., has become associated with the Louis Allis Co., Milwaukee, in an executive sales capacity.

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A Campbell White has been appointed district sales manager for Texas by the Eastern Rolling Mill Co., Baltimore, and will be located at Houston. Mr. White has sold sheets in the Texas territory for several years.

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Frank M. Davis, president, Davis & Thompson Co., Milwaukee, manufacturer of special automotive machine tools, has returned from Europe, where he spent four months in recreation and observation of business.

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F. C. Reed has been appointed sales representative for New England, with headquarters in Springfield, Mass., by the Eastern Rolling Mill Co., Baltimore. Mr. Reed has been selling sheets in that territory for several years.

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Franklin G. Smith, president, Osborn Mfg. Co., Cleveland, has been elected director of the Foundry Equipment Manufacturers' association. This association has prepared and filed a code under NRA covering the manufacture and sale of foundry machinery and equipment.

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Frederick D. Rogers, 80 Federal street, Boston, will handle sales for the Coppus Engineering Corp., Worcester, Mass., in Maine, New Hampshire, Vermont and that part of Massachusetts east of Worcester county. This territory was formerly covered from the home office. A marked pick up in New England business occasioned this change of representation.

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James T. Castle, 424 First avenue, Pittsburgh, has been appointed district representative for western Pennsylvania, northern West Virginia, and the border counties of Ohio by Roots-Connersville-Wilbraham, Connersville, Ind., manufacturers of blowers, pumps and meters. Both Mr. Castle and D. J. McConnell, who is associated with him, have had many years' experience in selling machinery of this type in the Pittsburgh area.

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W. Worley Kerlin, metallurgist, technical department, Gray Iron instiute, Cleveland, has resigned to accept the position of metallurgist, Superior Foundry Co., Cleveland. Mr. Kerlin received his technical training at the University of Michigan. He was employed as research chemist in the metallurgical laboratory of the Packard Motor Car Co., Detroit, and later as metallurgist at the company's foundry. For five years previous to 1931 he devoted his time to core and molding sand problems, first with the Valley Mould & Iron Corp., Sharpsville, Pa., and then with the American Radiator Co., Buffalo, and the Enterprise Sand Co., Pittsburgh, and Conneaut, O. He became associated with the Gray Iron institute in 1931.

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A. R. Sleath, 502 Haverford avenue, Narberth, Pa., has been appointed representative in the Philadelphia district for the Ex-Cell-O Aircraft & Tool Corp., Detroit, including its Continental Tool Works and its Krueger-Wayne Tool Co. divisions. Mr. Sleath has been active in the machine tool industry for many years.

D. V. Chancellor, with headquarters at 1010 Bellemeade avenue, Evansville, Ind., has been appointed manufacturer's representative for the same companies in southern Indiana and surrounding territory.

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Hugh Morrow, president, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., is a member of the compliance committee of NRA for the Birminghan district.

Sheet Production Advanced in August; Sales Reduced

Sheet steel production in August averaged 6577 net tons daily, compared with 6069 tons in July, according to the National Association of Flat Rolled Steel Manufacturers, Pittsburgh. Sales declined from 5619 tons daily in July to 5123 tons in August. Shipments for August averaged 5628 tons, up nine tons from the preceding month.

Total production last month was 203,893 tons; sales, 158,830 tons; and shipments, 174,480 tons. Unfilled tonnage Sept. 1 amounted to 212,879 tons, against 228,696 tons Aug. 1. Total sheet capacity in the United States for August was approximately 550,000 tons, and the capacity on which the association's figures are based was 325,000 tons.

Died:

LEIGH H. ELLIOTT, 73, at his home in Gates Mills, O., Sept. 26. After many years' association with the Columbus & Hocking Valley Coal & Iron Co., Columbus, O., he was employed in 1893 by Condit, Fuller & Co., Cleveland which became the Bourne-Fuller Co. in 1896. Mr. Elliott was secretary, treasurer and vice president of the company until its absorption by the Republic Steel Corp. in 1930. He remained with the Republic organization about a year.

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David Frank, 72, founder of the Greenpoint Metallic Bed Co., in Manhattan (New York) Sept. 25.

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Henry Lengfelder, president, Orbon Stove Co., Belleville, Ill., in that city, Sept. 25. The company is one of the largest in the Belleville district.

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Miles B. Lambert, 60, retired transportation sales manager of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., in New York, Sept. 25.

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Joseph N. Shenstone, former president, Massey-Harris Co., Toronto, Ont., manufacturer of farm implements, at Toronto, Sept. 18. He was 79.

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David G. P. Justice, until his retirement in 1924 manager of the Pittsburgh Valve Foundry & Construction Co., Pittsburgh, at Crafton, Pa., Sept. 25.

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Clement Remington Hoopes, 84, at his home near Philadelphia, Sept. 22. For more than 20 years he was president of Hoopes & Townsend Co., bolt, nut and rivet manufacturer, and also was vice president of the Crucible Steel Casting Co. He retired from business about ten years ago.

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John C. Henderson, 56, consulting engineer with the Driver-Harris Co., Harrison, N. J., Sept. 25 at Elizabeth, N. J. Mr. Henderson was the inventor of several heat-resisting metal molds and held patents on several methods for the casting of nickel and chomium alloys.

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Morris B. Block, 62, president, Wisconsin Iron & Metal Co., in Oshkosh, Wis., Sept. 23. He entered into a partnership with the late Nathan Goldbus, and the company was incorporated in 1918. He was born in Rusia and came to this country at the age of 18.

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James P. Millwood, 65, chief chemist, Okonite Co., Passaic, N. J., cable

(*Please Turn to Page* 72)

August Exports Gain Heavily; Imports Decline from July

IRON and steel exports from the United States in August gained 31,063 tons over July, to a total of 119,374 tons, the second highest figure for any month in 1933, according to compilations of the bureau of foreign and domestic commerce.

Increases were registered by two classes of material for every one that showed a decrease, and each of the month's leading markets showed a definite improvement in volume over July.

Even if scrap iron and steel were excluded, and this item gained 22,593 tons, an increase of 8470 tons resulted from heavier overseas purchases of 39 other classes.

Imports in August were 5966 tons less than in July, totaling only 46,839 tons. Sharp declines were registered in scrap, ferromanganese, rails and fastenings. Structural materials, hoops and bands were in larger volume than in July.

Superiority of 1933 export trade over that of 1932 is increasingly manifest. August of this year totaled just short of four times that of August, 1932. Most of this improvement, which totals 327,716 tons, is directly attributable to exports of scrap, which increased 320,887 tons. With this left out of account there is an increase of 6829 tons in other materials. Leading gains are in barbed wire, seamless casing and oil line pipe, tin plate, heavy rails, and steel bars.

Cumulative imports in 1933 exceed those of 1932 by 958 tons, the first time in a considerable period when the import trade of a current year has exceeded that of a preceding year.

FOREIGN TRADE OF UNITED STATES IN IRON AND STEEL

Gross Tons

	1933		1932	
	Imports	Exports	Imports	Exports
Jan.	21,892	56,720	31,053	40,660
Feb.	19,748	63,936	26,738	40,492
March	22,114	80,567	41,031	49,927
April	28,061	100,395	35,935	58,086
May	26,295	123,069	39,751	80,477
June	34,368	102,581	34,494	52,081
July	52,805	88,311	18,005	52,558
Aug.	46,839	119,374	23,623	32,955
8 mo.	252,122	734,953	251,164	407,237
Sept.	.....	.....	29,241	36,038
Oct.	.....	.....	33,693	41,226
Nov.	.....	.....	34,924	56,041
Dec.	.....	.....	29,390	54,118
Total	.....	.....	378,282	594,691

ORIGIN OF AUGUST IMPORTS

Gross Tons

	Pig iron	Manganese ore	Ferromanganese
Kwantung	383	.....	.....
Netherlands	6,176	.....	.....
Japan	79	.....	.....
Sweden	177	.....	.....
Canada	3,413	.....	2,120
British India	8,260	.....	.....
Germany	.....	2	.....
Soviet Russia in Europe	.....	3,501	.....
Cuba	.....	1,905	.....
France	.....	.....	21
Norway	.....	.....	2,548
United Kingdom	.....	.....	200
Total	18,488	5,408	4,889

	Sheets, skelp and sawplates	Structural shapes	Steel bars	Hoops and bands
United Kingdom	16	26	45	3
Belgium	562	1,754	841	1,040
France	256	626	147	974
Germany	14	488	332	1,238
Sweden	2	.....	145	48
Japan	11	.....	.....	.....
Norway	.....	.....	1	.....
Czechoslovakia	.....	.....	2	.....
Austria	.....	.....	5	.....
Total	861	2,894	1,518	3,303

Tool Steelmakers Merge

Vascoloy-Ramet Corp., North Chicago, Ill., has been formed to manufacture tantalum carbide cutting tools, dies, wearing surfaces and similar products. The new company will consolidate the abilities, experience and research developments of the Vanadium-Alloys Steel Co., Pittsburgh, Fansteel Co. Inc. and the latter's subsidiary, Ramet Corp. of America, both located in North Chicago, Ill.

Sales will be through the sales department of the Vanadium-Alloys Steel Co. and its sales agencies, including agencies of the Ramet Corp. of America.

UNITED STATES IMPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Commodity	Aug. 1933	July 1933	Aug. 1932
Pig iron	18,488	18,339	7,198
Sponge iron	100	52	.....
Ferromanganese, spiegeleisen	4,889	7,252	1,134
Ferrochrome	.....	.....	14
Ferrosilicon	28	31	8
Other ferroalloys	.....	.....	.....
Scrap	9,508	13,391	864
Steel ingots, blooms, etc.	121	20	14
Concrete bars	99	122	533
Hollow bar, drill steel	54	44	99
Merchant steel bars	1,518	1,605	1,432
Iron slabs	.....	.....	.....
Iron bars	53	48	101
Wire rods	1,174	1,753	395
Boiler and other plate	35	11	28
Sheets, skelp, saw plate	861	705	1,164
Tin plate	9	14	4
Structural shapes	2,894	2,306	1,835
Sheet piling	.....	.....	.....
Rails and fastenings	1,184	2,581	534
Cast-iron pipe, fittings	148	190	.....
Welded pipe	369	475	358
Other pipe	176	166	236
Barbed wire	347	550	859
Round iron, steel wire	378	388	68
Telegraph, telephone wire	10	.....	.....
Flat wire, strip steel	168	90	113
Wire rope, strand	179	115	103
Other wire	189	126	85
Hoops and bands	3,303	1,842	5,664
Nails, tacks, staples	379	339	671
Bolts, nuts, rivets	18	22	38
Horse and mule shoes	35	56	9
Castings, forgings	125	172	111
Total	46,839	52,805	23,673

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Commodity	Aug. 1933	July 1933	Aug. 1932
Pig iron	412	106	194
Ferromanganese, spiegeleisen	3	3	2
Iron and steel scrap	70,145	47,552	12,578
Ingots, blooms, billets, slabs and sheet bars	699	149	53
Bars, iron	47	96	25
Bars, steel	2,493	1,873	760
Bars, alloy steel	135	129	82
Wire rods	1,268	1,038	469
Boiler plate	52	131	107
Other plate, not fabricated	868	903	676
Skelp, iron or steel	1,184	3,568	2,201
Iron sheets, galvanized	78	141	62
Steel sheets, galvanized	3,091	2,958	944
Steel sheets, black	2,945	2,151	2,010
Iron sheets, black	354	133	73
Strip steel, cold-rolled	827	1,158	294
Hoop, band, and scroll iron or steel	1,112	1,563	354
Tin, terne plate	7,333	6,276	2,449
Water, oil, gas, other tanks, except lined	154	336	72
Shapes, not fabricated	2,594	1,299	1,715
Shapes, fabricated	1,144	865	354
Plates, fabricated	41	63	56
Metal lath	83	193	52
Frames, sashes and sheet piling	97	62	631
Rails, 50 pounds	2,490	1,463	180
Rails, under 50 pounds	461	113	41
Rail fastenings	760	179	56
Switches, frogs and crossings	75	58	37
Railroad spikes	290	122	71
Railroad bolts, nuts	55	42	13
Boiler tubes, seamless	337	209	449
Boiler tubes, welded	16	8	21
Casings and oil line pipe, seamless	1,214	798	229
Casing and oil line pipe, welded	133	794	5
Seamless black pipe, other than casing	94	52	43
Malleable-iron screwed pipe fittings	229	212	105
Cast-iron screwed pipe fittings	91	83	46
Cast-iron pressure pipe and fittings for	347	549	16
Cast-iron soil pipe and fittings for	643	495	155
Welded black steel pipe	1,568	1,221	691
Welded black wrought iron pipe	58	100	78
Welded galvanized steel pipe	2,278	2,302	1,441
Welded galv. wrought-iron pipe	50	59	38
Riveted iron or steel pipe and fittings	20	25	43
Plain iron, steel wire	1,447	561	185
Galvanized wire	1,873	965	133
Barbed wire	3,672	2,336	813
Woven-wire fencing	135	54	93
Woven-wire screen cloth	71	77	49
Wire rope	181	203	72
Other wire, manufactures	298	132	188
Wire nails	1,442	1,026	331
Horseshoe nails	60	51	38
Tacks	55	26	24
Other nails, staples	336	245	121
Bolts, machine screws, nuts, rivets, washers	240	214	153
Iron castings	495	254	200
Steel castings	91	178	136
Car wheels and axles	392	142	222
Horseshoes	47	3	23
Iron, steel forgings, n.e.s.	171	214	198
Total gross tons	119,374	88,311	32,950

EDITORIAL

Harnessing the Power of Technical Development

THE fall convention season is on in full swing. It parallels the football season, starting late in September and continuing well into November. During that period, every week witnesses one or more meetings of national technical associations.

This year's schedule compares favorably with those of previous years, in spite of the fact that the extraordinary experiment of the government's recovery program is claiming the lion's share of industry's attention.

Last week saw the convention of the International Acetylene association in Chicago. This week, in Detroit, the annual meeting of the American Society for Steel Treating will be held in conjunction with conventions of the American Welding society, the Wire association, the Institute of Metals and Iron and Steel divisions of the American Institute of Mining and Metallurgical Engineers, and the Detroit section of the American Society of Mechanical Engineers. The National Safety council will hold its annual meeting in Chicago this week.

In the week of Oct. 16, the Association of Iron and Steel Electrical Engineers will convene in Pittsburgh and the American Institute of Steel Construction will meet in Chicago. Saturday, Oct. 21, has been designated as "Steel Day" at the Century of Progress Exposition. On Friday of the same week the metallurgical advisory board of Carnegie Institute of Technology will hold a conference in Pittsburgh. Fall meetings of the American Iron and Steel institute have been held in October, but it is doubtful whether a meeting will be held this year.

Pressure of Depression Problems Diverts Attention from Production and Sales

These and other meetings will be sprinkled abundantly throughout the weeks until mid-November, when on Nov. 17, the session of the Eastern States Blast Furnace and Coke Oven association of Pittsburgh, marks the close of the fall season of conventions.

To those who are interested in the technical and commercial development of their respective industries, these conventions should be of more than ordinary value. The stress of trying to steer a safe course through the depression has caused many executives to neglect technical research, market development and many other phases of production and merchandising. While this neglect is temporary and, in many cases, could not be avoided, the fact remains that advances in technical and commercial development must and will continue. Therefore, executives whose duties permit them to carry on in the field of technical and marketing research today have the responsibility of trying to make up for the absence of others who temporarily are engaged in other activities.

The discussions in technical sessions and the exhibits in the various shows scheduled for the present season will reflect many trends of progress which will prove to be of great importance in the next few years. In fact, it is safe to say that the new knowledge of metallurgy, design and merchandising which accumulates in a year's time will have a much more lasting and important influence on the industrial, economic and social life of the nation than all of the activity which has attended the hectic, artificial recovery program of the past six months.

Laboratories of Industry May Assist in Curing Some of Nation's Economic Ills

While the nation is engaged in the very necessary task of attempting to speed the return of prosperity, the forces of research and invention quietly are working for improved methods, better materials and broader applications of these methods and materials. Out of industry's laboratory will come developments which will help to solve some of the problems with which the recovery program now is struggling.

It is within the power of technical and marketing research to reshape industries, to redistribute production and consumption, to create new products and new markets, and to do many other things which challenge our attempts when we approach these problems from the economic or social angles. Possibly we would do better in our efforts to stabilize or control economic development if we were to direct more of our attention to pointing technical progress in the right direction. In any event, we are underrating the power of good in technical research.

All of the foregoing is a pertinent argument for devoting as much attention as possible to the fall conventions and expositions. If you are "fed up" with codes, balance sheets and labor problems, take a day or two off to visit the convention of your industry's technical association. The change of environment will do you good.

THE BUSINESS TREND

Business Yields Ground in Face of Uncertainties

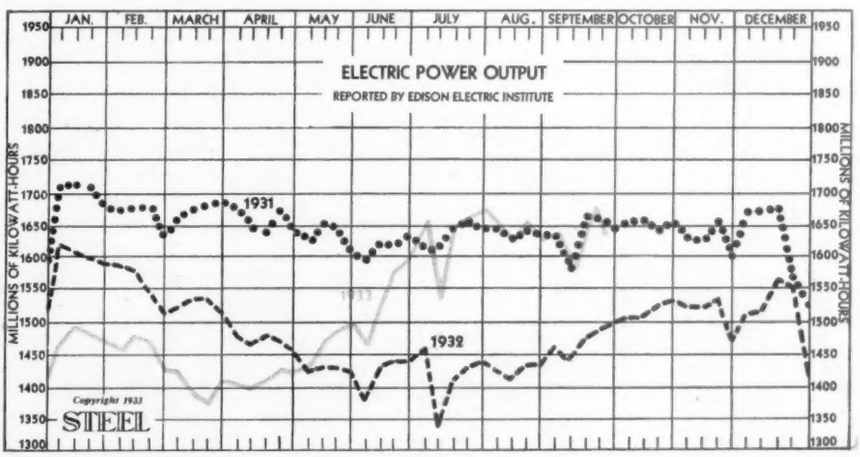
THE drift of business to lower levels continues. Resistance to the downward trend, signs of which seemed rather definite 10 days ago, has not developed in sufficient strength to reverse the direction of drift.

Most of the current records of business indicate slight recessions. Electric power output for the week ending Sept. 23 was 1,638,757,000 kilowatt hours, a drop of about 25,000,000 from the output of 1,663,212,000 in the previous week, which was the highest point touched in two years. As expected, car loadings in the week ending Sept. 16 increased sharply from those of the week which included Labor day. However, there was a trace of sluggishness in the record, because the rebound fell short of carrying loadings back to the level of the week of Sept. 2—the last normal week prior to Labor day. In each of the past four years freight traffic has reached its yearly peak late in September or in October.

The rate of steelmaking operations in the week ending Sept. 23 slipped slightly, after showing signs of remaining firm. The likelihood of strikes and further NRA confusion tend to offset the influence of quickened public works activity, buying stimulated by higher prices and other constructive factors.

Employment Gains Credited to NRA Almost Wiped Out by Business Slump and Strikes

The federal reserve indexes for August show the expected drops in industrial production and car loadings and gains in employment and payrolls. While the estimates for September indicate a 6-point loss in industrial production and less than a 2-point gain in employment, the margin of improvement for the latter is so slight that it may have been wiped out by the loss of wages due to strikes in the last few days of the month. In other words, the benefits of NRA, insofar as employment is concerned, are in danger of disappearing in the mire of business stagnation and labor strife.



1933	Million Kw.—Hr.
Sept. 23	1,638
Sept. 16	1,663
Sept. 9	1,582
Sept. 2	1,637

1932	Million Kw.—Hr.
Sept. 24	1,490
Sept. 17	1,476
Sept. 10	1,423
Sept. 3	1,464

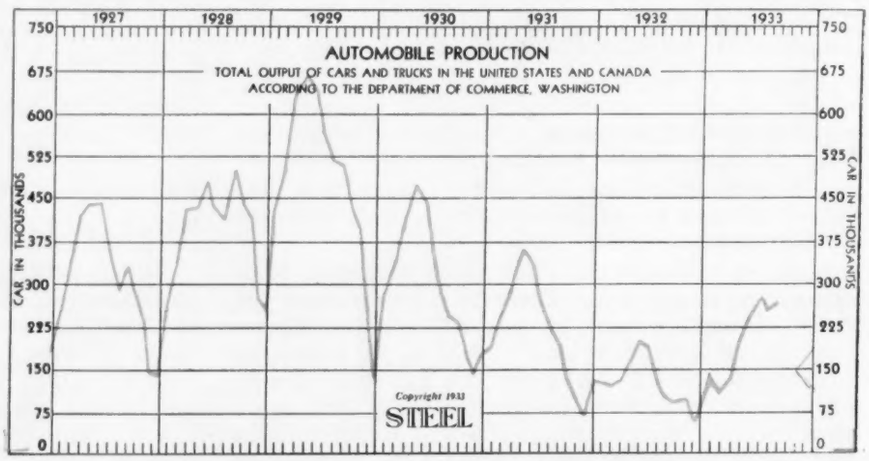
	Per Cent
August, 1933	50.4
July, 1933	40.4
August, 1932	30.3

Machine Tool Industry Continues Upward Swing

With new orders increasing for the fifth consecutive month, the machine tool industry continues to show a marked degree of recovery. According to the National Machine Tool Builders association, the three-month moving average for August was 50.4, a ten point rise over the preceding month and compares with 30.3 in August a year ago. Both shipments and unfilled orders are showing encouraging gains, the latter advancing over 16 points to register 74.1 for the eighth month.

Automobile Production Up Moderate in August

Production of passenger cars and commercial motor vehicles in the United States and Canada during August increased 2931 units. According to the latest report from the United States department of commerce, the August output totaled 242,559 units and compares with 94,392 units produced in August last year. Total production in this country and Canada to date now stands at 1,527,559 units, 96,015 more than the total output for all of last year.



August, 1933	242,559
July, 1933	239,628
August, 1932	94,392

	Per Cent
August, 1933	92
July, 1933	100
August, 1932	60

Industrial Production Index Off 8 Points in August

Industrial production in the United States during August declined 8 points from the revised figure of the preceding month. According to statistics compiled by the Federal Reserve board the index for August stood at 92 which compares with 60 in August, 1932. In the manufacturers group, losses were reported in all the major industries. Activity in the iron and steel industry declined 20 points in August for a total of 80 while the automobile output was off 9 points to 61.

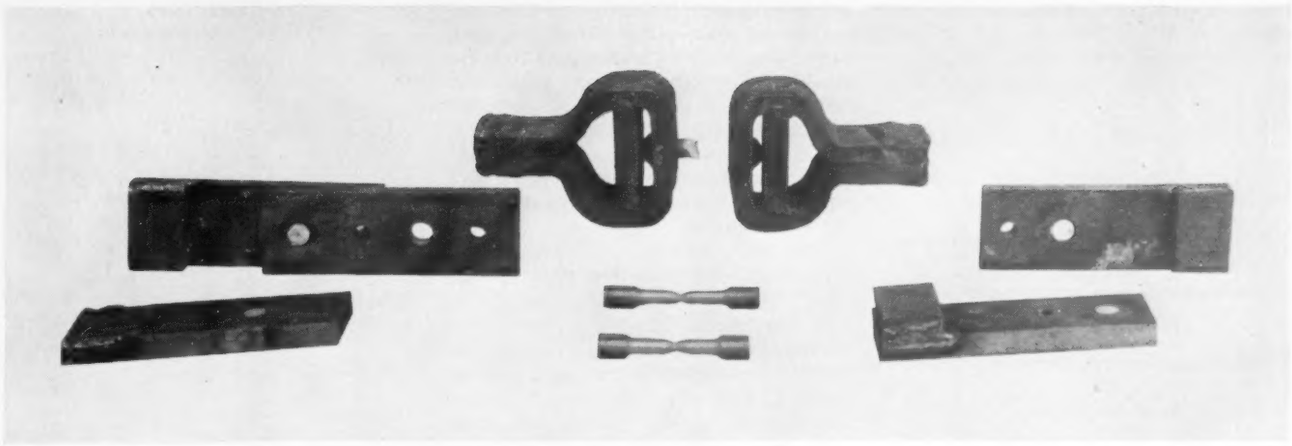


Fig. 1—Examples of physical tests on rivets. The method of making the tensile test is shown in the center above; double shear, at the left; and single shear, at the right. Tensile test bars are illustrated in the center below

RIVETS HAVE HIGH TENSILE STRENGTH WITHOUT EXCESSIVE HARDNESS

BY A. E. GIBSON

Vice President, Wellman Engineering Co.

A DISTINCTIVE feature of design incorporated in the two mobile mooring masts built for the United States navy and erected at its air stations in Lakehurst, N. J., and Sunnyvale, Calif., is the provision for telescoping the mast proper. To meet the demands of mooring, lowering and docking of dirigibles of the proportions of the MACON, specifications called for telescoping the masts from a maximum height of 160 feet to a minimum of 75 feet.

Details as to how this movement is accomplished were published in the Oct. 17, 1932, issue of STEEL in an article describing the Lakehurst mast erected in 1932, and in the April 10, 1933, issue of STEEL, in an article dealing with the Sunnyvale mast erected early this year. Briefly, the extensible tower comprises two 64-foot vertically-traveled sections, rectangular in shape. These sections are so constructed that the top unit telescopes within the lower one, and the lower one telescopes within a 21-foot fixed mast on the base of the machine. Rollers, mounted on antifriction bearings, serve as guides when the sections are telescoped.

Both masts were designed and fabricated by

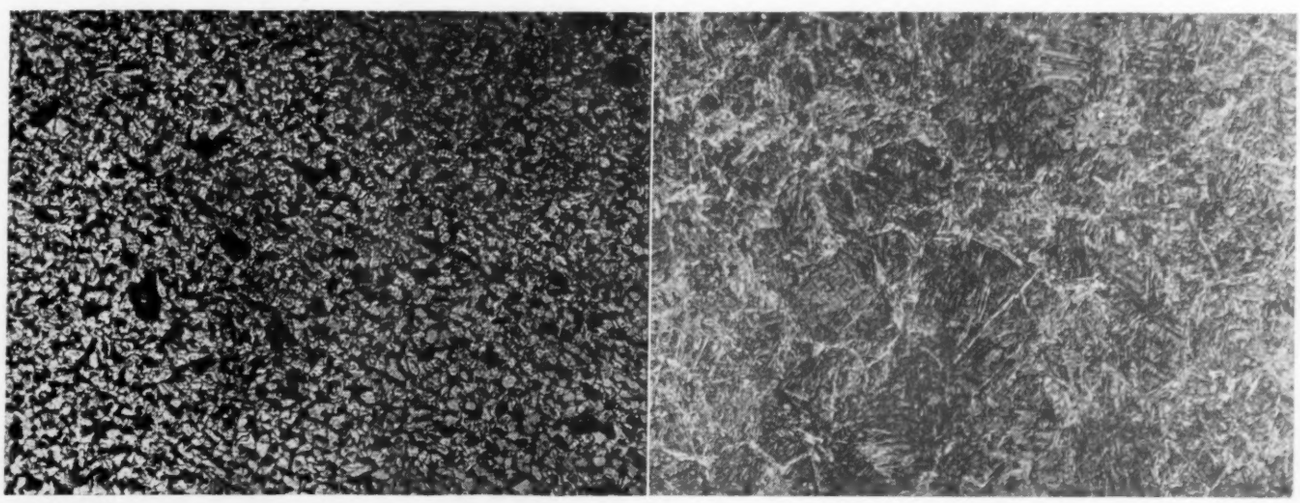


Fig. 2—Photomicrographs of SN-8 rivet stock (left) and SN-3 driven rivet (right) revealing clearly refinements in grain structure brought about through heating and cooling of rivet in contact with the cold hole. Taken at 150 diameters

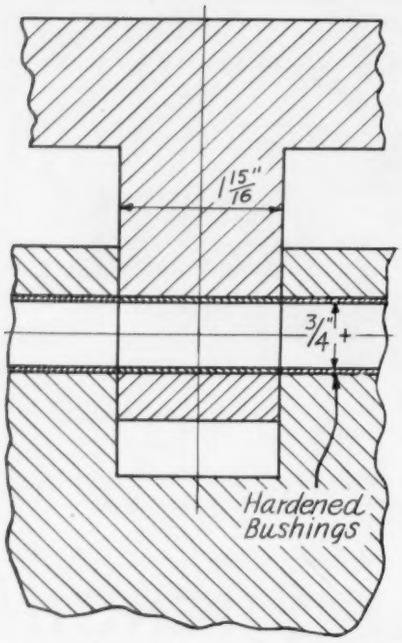


Fig. 3—Shear blocks employed in making additional double shear tests on undriven and driven SN-8 rivets

the Wellman Engineering Co., Cleveland, according to rigid specifications laid down by the navy department. Because of the height of the mast, as compared to the size of the supporting base, it was essential that the weight of the structure be kept low, therefore the movable sections were made of alloy steel. This required use of alloy steel rivets to provide strength equal to the structural sections.

Several kinds of alloy steels were made into rivets and tested in single and double shear, also in tension, and as a result of these tests, a steel of 0.30 per cent carbon and 1.60 per cent manganese, giving tensile strengths above 90,000 pounds per square inch was chosen as the most suitable. The excessive hardness of driven rivets made from this steel, however, presented a serious difficulty.

Rivets Were Countersunk

Corner angles of the mast sections were required to present a smooth surface to the guide rollers and this necessitated countersinking the rivets and finishing their heads flush with the angles. An effort was made to remove these heads with pneumatic chisels, but chisels made from half a dozen steels failed to hold a cutting edge in chipping. Consequently, the 64-foot mast sections were put on a planer, the speed of which was reduced sufficiently to plane the heads almost flush. The small amount of metal left by the jump of the tool in cutting the excessively hard steel was removed by hand grinders.

Prompted by this experience, the Wellman Engineering Co. recently made an effort to obtain a new type of steel for high-tensile rivets—a material which would be free from the brittleness and excessive hardness of manganese steel and would at the same time meet the specifications of the navy department. After consulting with the engineering staff of the Electro Metallurgical Co., New York, the latter company furnished a chromium-manganese-silicon steel which was subjected to extensive tests in the Wellman laboratory.

This steel, known as Cromansil, not only met the requirements of the navy department's specification 43R1c, amended April 28, 1931, but far exceeded these specifications in single and double shear, tensile strength and reduction of area. Furthermore, this new rivet material was found free from the detrimental quality of excessive hardness after driving, which is experienced in rivets containing over 1.00 per cent manganese.

The laboratory investigation included tests of riveted joints in single shear, and double shear and tension, also tests of parent metal. The cromansil plate, in ¾ x 3-inch section, was furnished by the Lukens Steel Co., Coatesville, Pa.; the rivet stock furnished by the Electro Metallurgical Co. was supplied in two carbon contents. Chemical compositions and physical properties of the plate and rivet stock were as follows:

Plate

Chemical Composition

	Per cent
Carbon	0.22
Silicon	0.65
Manganese	1.13
Chromium	0.50
Sulphur	0.018
Phosphorus	0.020

Physical Properties

Tensile strength, pounds per square inch	92,000
Elastic limit, pounds per square inch	63,000
Reduction of area, per cent	56.0
Elongation in 2 inches, per cent	22.5
Hardness, Rockwell B	85
Hardness, Brinell	168

Rivet Stock

Chemical Composition

	Type SN-7, per cent	Type SN-8, per cent
Carbon	0.105	0.19
Silicon	0.68	0.60
Manganese	1.17	1.10
Chromium	0.38	0.30

Physical Properties

	Type SN-7	Type SN-8
Tensile strength, pounds per square inch	77,000	89,500
Elastic limit, pounds per square inch	59,000	60,000
Reduction of area, per cent	77.0	71.4
Elongation in 2 inches, per cent	37.0	32.0
Hardness, Rockwell B	80.0	84.0
Hardness, brinell	151	163

Fig. 1 illustrates the types of tests made—single shear, double shear and tensile—and also shows the two tensile pieces of the SN-7 and SN-8 rivet stock. In making the tension test pieces, the bars were bent in U-shape and riveted, after which the cross stiffener bar immediately in back of the rivet head was welded in place and the two sides of the U then were closed in and welded to provide for the pieces being gripped in the jaws of the testing machine. The double shear test pieces had blocks of steel spot welded between the parallel bars to prevent the bars from closing in during the tests. For the single shear tests, blocks of steel were welded to the test bars to prevent excessive bending while the test was under way.

Electric Heat Employed

In all tests of single rivets, the rivets were of ¾-inch nominal diameter, driven in holes reamed to 13/16-inch diameter, the tests being made in a 200,000-pound Olsen testing machine. To prevent offset rivets, the members were securely bolted together before riveting. All rivets were electrically heated and driven with a pneumatic bull riveter. Stresses in pounds per

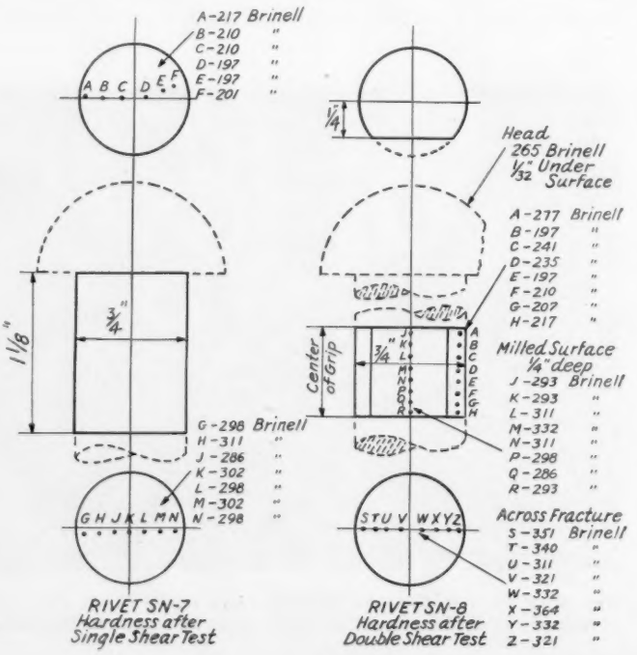


FIG. 4 — Hardness tests of driven SN-7 and SN-8 rivets. Rapid cooling of the rivet in contact with the hole increases the hardness of both rivet and bar

square inch were figured on the 13/16-inch diameter. In the single shear tests, results were obtained as follows:

Rivets	Test No.	Shearing Load, pounds	Shearing Load, pounds per square inch
SN-7	1	42,600	82,200
SN-7	2	39,500	76,400
SN-7	3	39,100	75,500
SN-7	4	38,200	73,700
SN-7	5	42,800	82,500
SN-8	1	52,400	101,100
SN-8	2	54,400	104,900
SN-8	3	50,700	97,800
SN-8	4	60,500	116,680

The following results were obtained in the double shear tests:

Rivets	Test No.	Shearing Load, pounds	Shearing Load, pounds per square inch
SN-7	1	73,100	70,500
SN-7	2	76,600	73,850
SN-7	3	76,300	73,550
SN-7	4	76,700	73,950
SN-7	5	78,900	76,050
SN-8	1	96,300	92,850
SN-8	2	102,600	98,950
SN-8	3	109,300	106,350
SN-8	4	101,300	97,700
SN-8	5	93,400	90,050

Additional double shear tests of an undriven rivet and driven rivet of SN-8 steel were made. A rivet was driven into a 3-inch block of steel reamed to 0.750-inch diameter, and the block was cut away, leaving the rivet. This rivet then was sheared in double shear in the blocks shown in Fig. 3. A similar test was made of an undriven rivet. The undriven rivet, having an area of 0.4197 square inch, sheared at a load of 53,400 pounds, or 63,615 pounds per square inch. The driven rivet, having an area of 0.4418 square inch, sheared at a load of 99,600 pounds, or 112,220 pounds per square inch.

An interesting set of tensile tests of driven rivets was made. The type of test is illustrated in Fig. 1 and was described in the foregoing test. It was found practically impossible to eliminate all bending in the test pieces, due to the difficulty of bending the bars so that the gripping extensions would be in line with the center line of the rivet, however, the introduction of bending stress would tend to reduce the recorded tensile stress rather than increase it. Results of this test are recorded as follows:

Rivet	Test No.	Tension, pounds	Tension, pounds per square inch
SN-7	1	68,300	131,700
SN-7	2	64,300	124,000
SN-8	1	70,000	135,000
SN-8	2	83,500	161,000
SN-8	3	79,700	153,700

The fracture in the rivet SN-7 (No. 1), as shown in the test piece in Fig. 1, started at the rivet head and extended on an approximate 30-degree plane for a vertical distance of ⅝ inch. The rivet showed considerable necking and was reduced from 0.8125 to 0.699 inch diameter, a reduction in area of 25.9 per cent.

Referring to SN-8 (No. 1), all tension tests broke in the rivet shank with the exception of SN-8 (No. 2), which sheared through the driven head, leaving a ring washer of what was originally the head of the rivet.

Distortion Is Compared

In test SN-8 (No. 2), one bar was cromansil, the other low-carbon steel. The low-carbon steel bar was distorted badly in pulling, the rivet hole enlarging from 13/16 inch to approximately 63/64 x 1 5/32 inches on the tension side of the bar. The hole in the cromansil plate enlarged to 27/32 x 55/64 inch. Relatively small distortion of the cromansil bar was obtained, as shown in Fig. 1. Two additional tension tests were made of driven rivets SN-8; one of a ¾-inch rivet turned to 0.505-inch diameter, and the other a rivet of 0.578-inch diameter as driven. Both tests were of rivets which had been removed from the block in which they were driven. The following results were obtained:

	0.505-inch diameter	0.578-inch diameter
Elastic limit, pounds per square inch	95,000	106,600
Ultimate strength, pounds per square inch	150,400	120,810
Reduction of area, per cent	33.4	42.0
Elongation in 1 inch, per cent	20.0	.....

The phenomenal increase in tensile strength from 77,000 pounds per square inch in the rolled bar turned to 0.505-inch diameter, to over 135,000 pounds per square inch for the rivet (the lowest tensile obtained with an SN-8 rivet) indicates the beneficial effect of the heat treatment upon the physical properties of cromansil steel rivets. This treatment consists in heating the rivet to the necessary riveting temperature and cooling it rather quickly by contact with the cold piece. Working of the steel in the upsetting operation of riveting also imparts a beneficial effect.

The hardness of cromansil steel in its various stages of working from bar stock to the driven rivet was determined as follows:

	Hardness Rockwell B
Rivet bar stock SN-7	80
Rivet bar stock SN-8	84
Undriven rivet SN-7, near head	75-77
Undriven rivet SN-8, near head	82-83
Undriven rivet SN-7, lower shank	80
Undriven rivet SN-8, lower shank	84
Driven rivet SN-7, about ½ inch from head	98-102
Driven rivet SN-7, about 1/16 inch below surface	93-95
Driven rivet SN-8, at center of shank	90
Driven rivet SN-8, on head	102

(*Please turn to Page 37*)

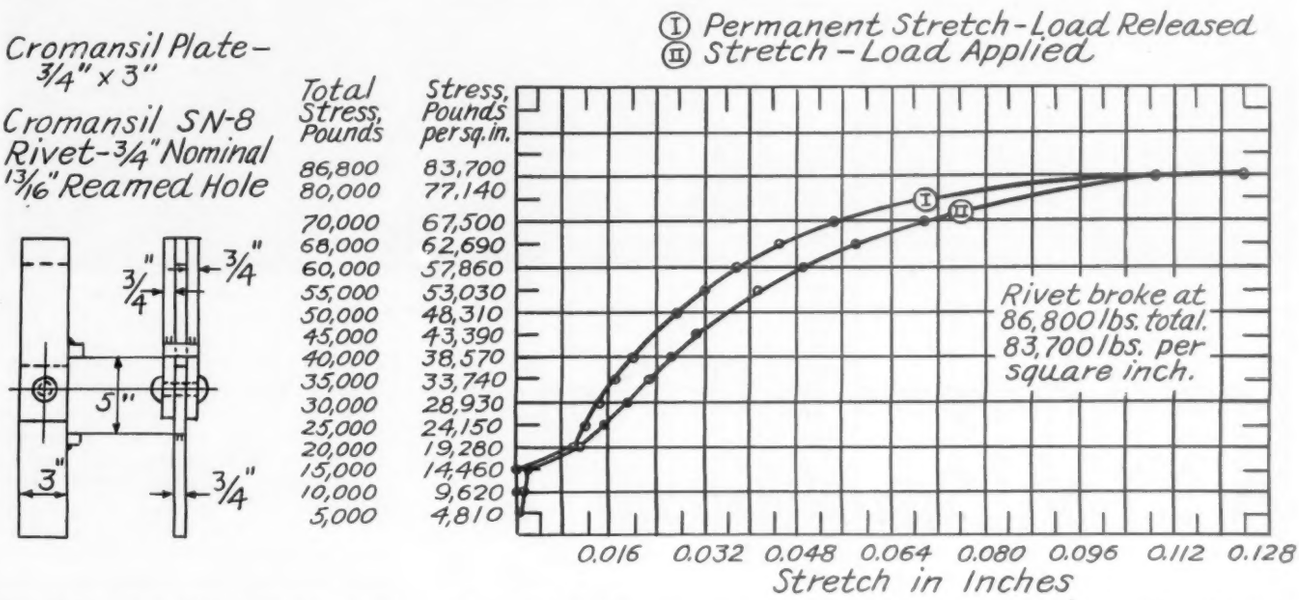


Fig. 5—Curve plotted from data obtained in measuring slip and strain in a double shear test piece riveted with SN-8 rivet

Pouring a test prior to tapping an electric steel foundry heat

Recent Progress in Drafting A.S.T.M. Specifications For Steel Castings

BY R. A. BULL*

CONSIDERING the inherent limitations of each foundry metal, approximately the same degree of advance seems to have been made, metallurgically and otherwise, in the production of each of the four general kinds of cast products. Certainly no enthusiastic foundryman who makes steel, malleable iron, gray iron, or nonferrous metal can claim without being vigorously and intelligently disputed, that the progressive producers in his division of the casting industry have shown a greater appreciation of the possibilities of their own metal than has been manifested by the most competent members of any other division of the industry. Restricting comparison to the outstanding plants and gaging accomplishments by the limiting opportunities for progress in each foundry metal, the contest for metallurgical advancement appears to have resulted in a draw to date.

Probably that is as it should be, for the ultimate benefit of all concerned. Fortunately for the branch of the foundry industry whose product is now to be particularly discussed, steel offers a field for metallurgical development which is enormously greater than that presented by any other foundry metal. This condition, serving to distribute rather than to concentrate experimental effort by steel foundrymen, has been a handicap in the efforts to secure prompt agreement on specification requirements.

It would be incorrect to assume either that all A. S. T. M. specifications have been kept up-to-date continuously, or that the society is indifferent when its purchase requirements have become out-moded. The A. S. T. M. can keep pace with the industry in formulating new requirements only when affiliated, interested, responsible, producers and consumers in considerable numbers agree to take action consistent with manufacturing and testing progress. Those specifications for ferrous castings, which have been issued by the society and significantly indicate the results of what may be called good modern foundry practice, have been developed after a great deal of metallurgical activity that has been displayed by casting producers since the short-lived business slump of 1921. Unquestionably the aggressive policies of welding proponents helped materially to stimulate foundrymen. For that fact those who make castings might justifiably feel thankful at least in the abstract.

First of New Series in 1925

The first of the "modernized" A. S. T. M. specifications issued for the product of the steel foundry were those for "Carbon-Steel Castings for Valves, Flanges, and Fittings for High-Temperature Service," tentatively adopted in 1925. After several revisions they were advanced to standard in 1929, and now have the designation A95-29. These call for but one grade of metal, adapted for temperatures only moderately high, since very high temperatures call for

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the use of alloy steel. The minimum physical requirements are 70,000 pounds for tensile strength, 36,000 pounds for yield point, 22 per cent for elongation, and 36 per cent for reduction of area. The committee of the Testing society which developed these specifications hopes soon to formulate purchase requirements for steel castings to withstand high temperatures beyond the feasible limit for carbon steel.

Requirements Were Modified

In 1930 the Testing society issued Tentative Specifications A128-30T for Austenitic Manganese Steel Castings." These requirements, covering the product frequently known as Hadfield's manganese steel, were slightly modified and advanced to standard at the 1933 convention of the society, automatically taking the designation A128-33. Modifications changed the chemical limitations by excluding a maximum limit for manganese and by including a maximum limit of 0.05 per cent for sulphur. The chemical requirements still call for a minimum limit of 10 per cent for manganese, a range of 1.00 to 1.40 per cent for carbon, and a maximum limit of 0.10 per cent for phosphorus. In these specifications tensile tests are not required, and bend test values, optional as specified, are prescribed. Usually austenitic manganese steel is not subjected to physical tests for determining acceptability.

Within three years after the new specifications for austenitic manganese steel castings were tentatively adopted, both gray iron foundrymen and malleable iron foundrymen reached agreement among themselves and with consumer, following which, in 1932, the next action indicative of progress in ferrous foundry practice was taken by the Testing society through the adoption of tentative specifications (separately for each of the two metals) for seven grades of gray iron and two grades of malleable iron.

For several years before the development of tentative specifications for austenitic manganese steel castings, many consumers urged the society to draft specifications for alloy steel castings for structural purposes. The delay that occurred in accomplishing this purpose has resulted in some incorrect impressions regarding the state of affairs in the steel casting industry.

In an article on the "Production and Heat Treatment of Alloy Steels" (for *castings*, important qualification in the title inadvertently omitted in printing), published in *Metals and Alloys* in September, 1931, the present writer mentioned the fact that the Testing society had sought for several years and was then seeking sufficient data on physical properties to justify the formulation of purchase requirements for alloy steel castings. A sectional committee of the society was organized in February, 1927, to consider the matter. As stated in the article mentioned, the principal reason for the length of time required to secure agreement by manufacturers and consumers was due to the steadily growing number of foundries producing alloy steel castings. The new producers wanted to have a voice in any decision on minimum physical properties, and they needed time to be able to state their preferences as the result of convincing experience. The increase in the number of foundries making alloy steels is reflected by statistics regularly assembled by the American Iron and Steel institute. Table I gives the outputs of alloy steel castings produced in the United States, beginning with 1910 and ending with 1932, translated into net tons. The data published by the institute show gross tons, and do not annually repeat the figures for many preceding years.

Table I

Output of Alloy Steel Castings in U.S.A.

Year	Net Tons	Year	Net Tons
1910	32,880	1922	66,196
1911	63,044	1923	103,286
1912	115,482	1924	96,262
1913	99,598	1925	126,093
1914	78,227	1926	163,633
1015	109,644	1927	163,345
1916	63,233	1928	190,045
1917	75,632	1929	216,071
1918	74,463	1930	141,264
1919	50,817	1931	100,691
1920	76,555	1932	45,969
1921	45,086		

High Output Recorded

It will be seen from the table that the largest output of alloy steel castings was reached in 1929. However, the proportion of alloy steel castings made in that year was but slightly more than 12 per cent of the total output of the industry. In 1932, while the production of alloy steel castings fell from the peak of 216,000 net tons to 46,000 net tons, the later figure represented the largest proportion (19 per cent) of alloy steel castings to total steel castings yet made in this country. In 1923 alloy steel castings amounted to but 6.3 per cent of all steel castings.

It is interesting to observe that the percentage drop in output for the four disastrous years ushered in during the latter part of 1929 was most noticeable in carbon steel castings, and less significant in alloy steel castings. Undoubtedly the proportionate drop was least pronounced in high alloy steel castings, although accurate data on the "high" sub-division are not obtainable. Any disposition to question this statement would automatically present the query: What is a high alloy cast steel? More on this point, later.

Specifications Are Adopted

Fortunately for the attainment of the objective sought for several years, the sectional committee of the Testing society, after accumulating data through several channels (chiefly by the cooperation of the American Foundrymen's association) reached an agreement in time to present for vote at the June, 1933 convention of the American Society for Testing Materials, a set of specifications for alloy steel castings for structural uses. The proposal to tentatively adopt these purchase requirements was officially approved, this action automatically causing the new tentative specifications (A148-33T) to be included in the society's 1933 *Book of Tentative Standards*. These specifications, like all others issued by the A. S. T. M., will be available in pamphlet form to anyone for a nominal price.

As a member of the circle within which serious consideration was given for six years to the formulation of specifications for alloy steel castings for structural applications, the writer is familiar with the conditions that justified the sectional committee in proposing purchase requirements that include no restrictions in chemical composition, excepting phosphorus and sulphur. The absence of such restrictions might prompt considerable speculation, if not explained. In a paper on "Special Steels for Castings," presented before the American Society of Mechanical Engineers in December, 1932, the writer declared that in his opinion there were probably not less than 60 varieties of low alloy steels then being produced for castings. It was stated that a distinction was made on a basis of 7 per cent of any element, for classifying a cast steel as "high" or "low." That is to say, any steel having as large a proportion as 7 per cent of any element except iron was considered by the writer for the purpose of his discussion to be outside of the low alloy classification. The figure was chosen arbitrarily and temporarily, and there is no authoritative basis even now on which to make this or a different distinction.

The chief reason for using that percentage was the increasing demand for alloy steels containing approximately 5 per cent of chromium

and occasionally carrying a little less than 7 per cent of that element. Some of these cast steels have chromium as the sole special element, others have chromium associated with molybdenum, and a few carry tungsten as a supplementary constituent. Possibly other elements are used or will be used in conjunction with chromium for the special purpose for which this group of alloy cast steels is generally used; namely, for pressure castings subjected to high temperatures and frequently to corrosive attack, as in return-bends for oil cracking stills. From the standpoint of current production these chromium steels seem to provide a logical dividing line for differentiating between "low" and "high" alloy cast steels.

The existence of some 60 or more varieties of low alloy steels would have presented a stupendous undertaking, if the attempt had been made to specify chemical composition so comprehensively as to cover every variety of alloy cast structural steel made by a reputable producer. Discrimination would have been unfair and unscientific.

Table II

Minimum Properties in Tentative Specifications For Alloy Steel Castings for Structural Use

	Tensile Strength, Lb. per Sq. In.	Yield Point, Lb. per Sq. In.	Elongation in 2 In., Per Cent	Reduction of Area, Per Cent
Class A:				
Grade 1	75,000	40,000	24	35
Grade 2	85,000	53,000	22	35
Class B:				
Grade 1	85,000	55,000	22	40
Grade 2	90,000	60,000	22	45
Grade 3	100,000	65,000	18	30
Class C:				
Grade 1	90,000	65,000	20	50
Grade 2	120,000	100,000	14	35
Grade 3	150,000	125,000	10	25

Classes Are Discussed

This fact may be better appreciated by citing and commenting on the tensile properties called for in these new purchase requirements, designated "Tentative Specifications A148-33T for Alloy Steel Castings for Structural Purposes." There are three classes, listed according to permissible heat treatment and to minimum tensile properties. Class A represents material that can neither be normalized nor liquid quenched, but must be heat treated by full annealing, once or several times at the producer's option. Class B covers castings to be heat treated by full annealing or by normalizing, according to the preference of the manufacturer, who is prohibited from liquid quenching the material. Full annealing or normalizing may be performed one or more times, as preferred by the foundryman. The grades covered by Class C are those that may be liquid quenched, or liquid sprayed, or rapidly cooled by a mechanical air blast. The manufacturer is given the right, when making castings in Class C, to full anneal and/or to normalize; and if he prefers, to apply any of the accelerated cooling treatments mentioned above. With these explanations, the physical properties in the various grades listed in Table II will be better understood than would be the case otherwise.

Normalizing Now Permitted

In some consuming circles there are objections to the normalizing of very thick steel castings. Up to a short time ago the U. S. Navy specifications prohibited normalizing without any qualification. However, these specifications recently were revised to permit normalizing within certain weight limits, and in other cases when special authority may be granted. The relatively low values for yield point and tensile strength in Grades 1 and 2 in Class A, listed in Table II, are the natural result of the full annealing treatment (or slow furnace cooling) required for those grades.

Probably from the standpoint of tonnage the most popular grades of alloy steel castings now being produced for structural application are Grades 1 and 2 of Class B. It will be noted that the first of these call for minimum values of 85,000 pounds—55,000 pounds—22 per cent—40 per cent; while Grade 2 calls for minimum values of 90,000 pounds—60,000 pounds—22 per cent—45 per cent. Grade 1 in Class B was chosen primarily to cover what is now commonly called medium manganese steel, according to the chemical composition broadly used for a number of years, and carrying no special element. In a few quarters previously there was some disinclination to classify this variety as an alloy cast steel, on the ground that no special element was contained in the metal. But the overwhelming majority of alloy steel foundrymen now agree that cast steel should be identified as an alloy grade when it contains a special element, or when it contains a customary element in proportion great enough to affect noticeably the properties influencing serviceability, as compared with the properties in common or carbon cast steel. Therefore a cast steel containing the usual percentages of carbon and silicon found in carbon steel, and carrying as much as 1.25 per cent of manganese would be an alloy steel. It is a simple low alloy variety of great commercial importance.

Grade 2 of Class B, while not now demanded in as large tonnages as Grade 1 of the same class, nevertheless has attained a popularity that is well merited. The minimum tensile properties required for this grade (90,000 pounds — 60,000 pounds—22 per cent—45 per cent) collectively illustrate the great difficulty from the standpoint of fairness and conciseness, of endeavoring to write restrictions for chemical composition into A. S. T. M. specifications of the kind now being discussed. Castings of this grade of steel are being very satisfactorily produced from several special varieties of medium manganese steel, as well as from varieties of alloy steels containing customary percentages of manganese. It would be superfluous to elaborate on the fact that heat treatment plays a most important part in connection with any combination of the elements in cast steel. However, the extent to which variable properties may be developed as the result of heat treatment, yet to be ascertained by the most experienced producers, must be taken into careful consideration when writing specifications.

Similarities Are Explained

Some consumers may wonder about the similarity in the tensile requirements for Grade 2 of Class A (85,000 pounds—53,000 pounds—22 per cent—35 per cent) and for Grade 1 of Class B (85,000 pounds—55,000 pounds—22 per cent—40 per cent); also for Grade 2 of Class B (90,000 pounds—60,000 pounds—22 per cent—45 per cent), and for Grade 1 of Class C (90,000 pounds—65,000 pounds—20 per cent—50 per cent). The required values in each grade in any class should be considered always in connection with the imposed limitations of heat treatment, previously explained. Unquestionably there will be many cases where heat treatment as specified for

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more than one grade may be applied with entire satisfaction, and where the consumer will be willing (justifiably) that the producer furnish material in either of two grades. for example, Grade 2 of Class B, or Grade 1 of Class C. Knowledge of the resistance needed for a part outside as well as within the stress-range represented by tension testing often should govern selection of composition and heat treatment. The competent producer's advice should be followed in many cases concerning such questions as these, and the additional problem of casting design. The latter factor, important when carbon cast steel is made, is especially vital in the production of many alloy cast steels.

Several points will occur to some readers in connection with what has been said. The first is that, since tensile properties alone do not adequately indicate adaptability for some applications, other means should be provided in the specifications to give assurance of serviceability. It happens that the tension test now is relied on satisfactorily by the majority of those who require structural steels, and, as all engineers know, it is at present the most effectively standardized method for determining resistance to the customary stresses imposed under most service conditions.

Creep testing machine in steel foundry laboratory

Other Tests To Come

The steady increase of our knowledge of testing will result inevitably in generally accepted methods of making physical tests other than that applying tension. It is unfortunate, from the standpoint of making accurate comparisons, that there is now no single method of making an acceptable shock test. The details of making the Charpy and Izod impact tests differ. Furthermore, unfortunately, the values derived from one of these very useful tests cannot satisfactorily be transposed in terms of the other test. Also the recommended methods of making the slots or notches for the test specimens to be used in a single testing machine differ. There may be mechanical difficulties, sometimes overlooked in the casual scrutiny of the finished test specimen, in making a thoroughly satisfactory and absolutely smooth notch or slot. Tool marks of slight degree lower the recorded resistance to shock, in testing, as in service.

Study Impact Testing in Detail

Recently a committee of the American Foundrymen's association was formed to study all details related to the impact testing of cast steel, in the expectation that eventually satisfactory methods will be recommended and applied in steel foundry and other laboratories where cast steel specimens may be shock tested. This committee expects to give serious consideration to every detail of the problem, beginning first with the proper manufacture of the cast coupon.

Among physical tests that are regarded as desirable by some consumers, particularly the U. S. Navy, is the cold bend test. Here again, there is no standardized method available. Difficulty in comparing results obtained in several laboratories arises from the established fact that the method used in bending the specimen of a given size from a given bar of steel governs to considerable extent the degree of curvature that may be developed before fracture occurs. When the test is required, usually the producer may make the bend by a method preferred by himself, on a specimen of prescribed dimensions. Relative results obtained in one laboratory are of course informative, and consequently should by no means be unqualifiedly criticised adversely. In this respect the bend test has a significance somewhat like that of the impact test, although the latter generally is believed by many metallurgists to provide the better indication of resistance to severe stresses imposed under most structural conditions. Consequently the impact test is applied to cast steel more often than is the bend test.

Among tests that are not standardized but are made in several ways, and are being used in increasing degree for determining the suitability of steel castings, is the hardness test, of great value for many applications. Probably the hardness test now takes second rank after the tension test in frequency of physical determinations made on cast steel. Obviously, the methods of heat treatment very largely regulate the hardness values in the finished product.

(To be concluded)

Board To Review Research Progress

SEVENTH annual open meeting of the Metallurgical Advisory board of the Carnegie Institute of Technology will be held at Pittsburgh, Oct. 20, in the administration hall of the Carnegie institute union. Reports of research activities will be made by advisory board investigators.

Opening report will be made by Dr. Robert F. Mehl, director of the metals research laboratory. During the first year of its reorganization, the laboratory has undertaken a number of new lines of research. Studies of iron-manganese and iron-manganese-carbon alloys have been continued through the year and will be summarized. Constitution of the ternary iron-manganese-carbon alloys with 2.5 and 4.5 per cent manganese has been finished; the electrical conductivity and thermal magnetic properties of binary magnetic alloys have been investigated; and the constitution of high manganese binary iron-manganese alloys has been studied. The studies nearly complete the proposed program on these alloys.

New work will be reported by Dr. Francis M. Walters Jr., on the study of the formation of ferrite from austenite in low carbon steels.

Studies on internal strain, having to do principally with X-ray determinations of internal strains in worked and heated metals and alloys,

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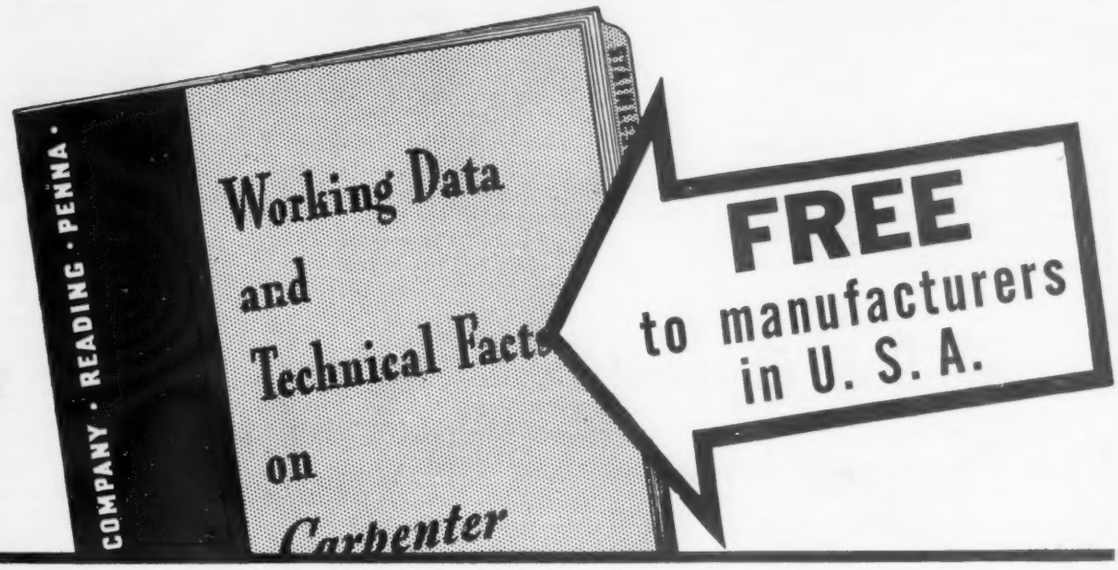

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- **how** to properly heat treat the various grades of Stainless Steel.
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To commemorate the occasion and to perpetuate Sir Robert's comprehensive

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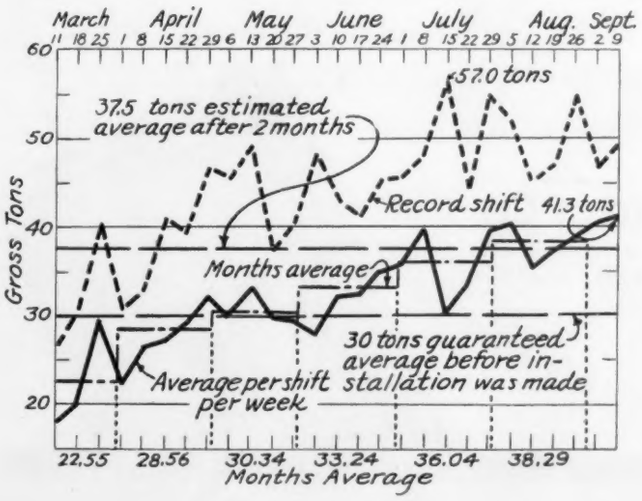
March April May June July Aug. Sept.
11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 1 8 15 22 29 5 12 19 26 2 9
60
50
40
30
20
Gross Tons
37.5 tons estimated average after 2 months
57.0 tons
Record shift 41.3 tons
Months average
30 tons guaranteed average before installation was made
Average per shift per week
22.55 28.56 30.34 33.24 36.04 38.29
Months Average

◆

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J. C. McQuiston, First National Bank building, Wilkinsburg, is secretary of the association.

Issues Souvenir of Fair

Steam and Combustion Co., 1559 Sheffield avenue, Chicago, has issued an 8-page illustrated souvenir bulletin describing three of the company's industrial gas boiler installations in exhibits at A Century of Progress exposition in Chicago.

Furnace Men To Meet

Eastern States Blast Furnace and Coke Oven association will conduct its fall meeting at the William Penn hotel, Pittsburgh, Nov. 17. The program, which will be announced later, will be confined to afternoon and evening sessions.

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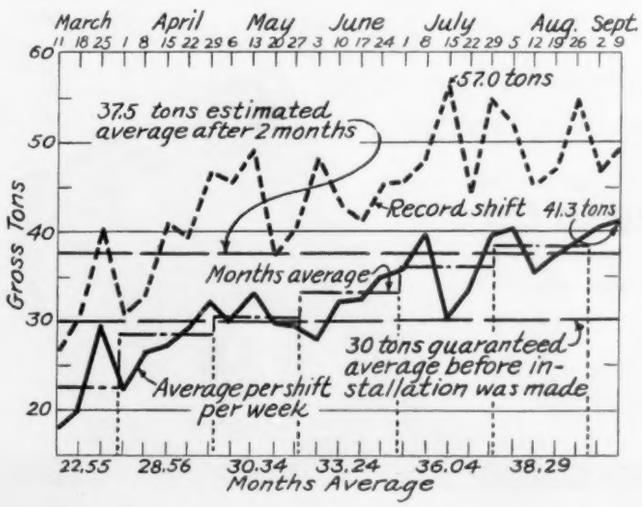
March April May June July Aug. Sept.
11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 1 8 15 22 29 5 12 19 26 2 9
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J. C. McQuiston, First National Bank building, Wilkinsburg, is secretary of the association.

Issues Souvenir of Fair

Steam and Combustion Co., 1559 Sheffield avenue, Chicago, has issued an 8-page illustrated souvenir bulletin describing three of the company's industrial gas boiler installations in exhibits at A Century of Progress exposition in Chicago.

Furnace Men To Meet

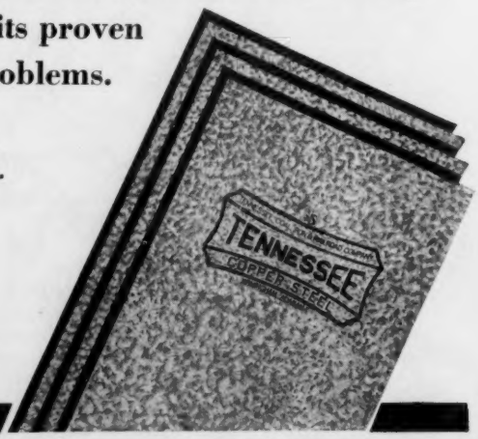
Eastern States Blast Furnace and Coke Oven association will conduct its fall meeting at the William Penn hotel, Pittsburgh, Nov. 17. The program, which will be announced later, will be confined to afternoon and evening sessions.

TENNESSEE SHEET STEEL

for VENTILATING SYSTEMS

TENNESSEE COAL, IRON & RAILROAD COMPANY
TENNESSEE
COPPER STEEL
BIRMINGHAM - ALABAMA

PROGRESSIVE architects and builders are now placing almost as great emphasis on proper ventilating systems in new office buildings, hotels and structures of like character, as they do on heating systems. Correct ventilation is now recognized as being vital to both health and comfort. Here are shown two illustrations of the ventilating system in the beautiful new buildings on the campus of the University of Texas, which has spent upwards of four millions in a program of expansion. The sheet steel ducts, which are shown weaving through the framework, will insure proper ventilation for every portion of this structure. These ducts are made of rust resisting Tennessee Copper Steel which meets the most exacting specifications of architects and builders because of its proven durability and adaptability to modern fabricating problems.



TENNESSEE COAL, IRON AND RAILROAD CO.
Subsidiary of United States Steel Corporation
General Offices, Brown-Marx Bldg., Birmingham, Ala.
District Offices in Principal Cities

U S STEEL

Seen

at A

CENTURY OF PROGRESS

PROGRESS in industry and transportation brought about through use of alloy steels and other alloys is depicted by the Electro Metallurgical Co. in what is claimed to be the largest carved glass mural ever made. Located in the exhibit of the parent company, the Union Carbide & Carbon Corp., this pictorial representation of the "age of alloys" is engraved in special plate glass and colored. The mural is shown in the illustration above.

It is 55 feet in total length and shows how commercial advancement has been brought about through use of lighter, stronger metal alloys.

Union Carbide & Carbon Corp.'s applied science exhibits also show many of the modern applications of alloy steels and other alloys. The corporation also has co-operated in construction of the basic science exhibit, "The Story of the Electric Furnace," demonstrating the place of the arc, resistance and induction-type furnaces in modern scientific progress.

♦ ♦ ♦

Several of the co-operating companies in the building of the Sky Ride have a joint exhibit in the Travel and Transport building. Mississippi Valley Structural Steel Co., Decatur, Ill., displays samples of electric welding and of rail joint bar reforming work. Inland Steel Co., Chicago, shows sections of various structural members. Inland also has a separate exhibit in the General Exhibits building. Sections of large cables furnished for bridge construction are featured by the John A. Roebling's Sons Co., Trenton, N. J. These include cable sections from the George Washington bridge between New York and Ft. Lee, N. J., and the Maysville, Ky., bridge. Otis Elevator Co., New York, and Great Lakes Dredge & Dock Co., Chicago, also have exhibits in this group.

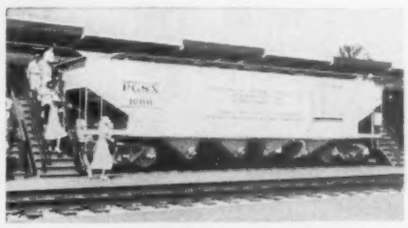
♦ ♦ ♦

Technical phases of automobile building feature the exhibit of the Chrysler Corp. which in addition includes a display of its various products and a proving ground. The method of casting two engine blocks in one flask, the procedure in forging a crankshaft and of testing various automotive parts are shown. A small testing laboratory includes equipment for the examination of different materials required in automobile building, while another display shows types of the many precision tools now used in in the Chrysler plants.

A large animated model of a Plymouth plant depicts in miniature the operations involved in manufacture of cars, another illustrating a typical enameling plant installation. For close inspection of the many parts entering into a modern automobile, a Plymouth sedan has been completely disassembled into 30,000 individual pieces which are placed for display on a long table. Illustrating the construction of the all-steel automobile body, one exhibit compares its features with those of a full-size section of a standard New York Central railroad steel passenger car.

♦ ♦ ♦

General Steel Castings Corp., Eddystone, Pa., and the Pullman Car & Mfg. Corp., Chicago, are exhibiting a steel hopper car, the entire underframe of which, extending the



full length of the car and including eight hoppers, is a one-piece steel casting. The car has a capacity of 140,000 pounds. Superstructure is welded.

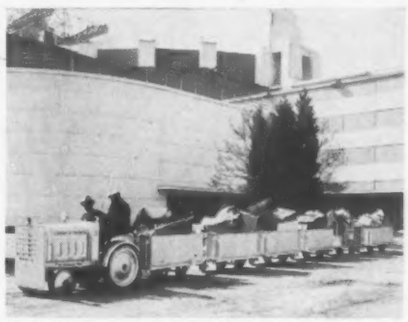
♦ ♦ ♦

Westinghouse Air Brake Co., Swissvale, Pa., and the Union Switch & Signal Co., Wilmerding, Pa., sponsor comprehensive exhibits of their various products in the Travel and Transport building. A comparison of the modern type of air brake with the earliest form of installation is made. Operation of a centralized traffic control system and of control cab signaling equipment is demonstrated by means of typical installations. American Steel Foundries, Chicago, shows progress in design of car couplers since 1840, exhibiting various types, including cast iron, malleable and wrought iron couplers, which preceded the manufacturer of the modern steel coupler unit.

♦ ♦ ♦

Disposition of the usual litter of debris abandoned by visitors, as well as waste from concessions and garbage from food shops, presented a problem which has been solved by the trackless train system used in industry. The system which handles all waste disposal at the fair consists of standard steel box body trailers and standard gasoline and electric tractors built by the Mercury Mfg. Co., Chicago.

The trailers, serving as waste baskets on wheels, are parked



around the grounds during the day. Starting after 11 p.m., the train crew assembles the trailers into trains, hauling them to the disposal station at the south end of the grounds where a locomotive crane picks up the steel box bodies and dumps the contents into railroad gondola cars. Application of this equipment to waste disposal is said to be a new idea in exposition history.

Besides economy of operation, the trackless train has shown a necessary flexibility, for several times the volume of waste exceeded estimates. Extra trailers were put into service, in many cases on overnight notice from the management, and the increased load was handled promptly and easily by repeated trips. Late-staying visitors have been fascinated by operation of the system. All tractors and trailers are equipped with safety self couplers and have rubber tires.

♦ ♦ ♦

Display of C. E. Johansson Inc., division of the Ford Motor Co., Detroit, includes various types of precision gage blocks and accessories designed to measure dimensions to an accuracy of one-millionth of an inch.

ABOUT 35 pounds of steel sheets is required for the typical automobile trunk, as installed on a medium-priced car. Trim is often of stainless steel

—Photo courtesy the Gabriel Co., Cleveland

LARGE USES OF STEEL IN SMALL WAYS

249th Article ◆ Automobile Trunks

INCREASING travel by automobile has popularized the use of luggage carriers since their introduction on the earliest cars more than 20 years ago. Today builders of higher priced cars make provision in the design of many body models for the mounting of a trunk, while racks may be added to practically any type of motor vehicle to transport a trunk. These units frequently are furnished by the motor manufacturer direct, more often are purchased by the car owner.

Developments in the design of automobile trunks over recent years have been concerned with making them more durable as well as more efficient in protecting their contents during exposure to inclement weather. In this connection steel has been widely adopted, supplanting fabric which formerly was used for the trunk surface. The carriers may be divided roughly into two different types—the pressed metal variety and the handbuilt wood and steel trunk. Made in inexpensive styles the former generally consists of a container stamped from about 18-gage cold rolled sheets without additional reinforcement, but with necessary hinges and locks.

In building the higher priced trunks, steel sheets are applied over a wood frame. Being an integral part of the automobile on which it is mounted, the carrier is made to conform in finish and in contour to the appearance of the body. In one design, automobile body sheets, 18 and 20 gage, are sheared to size and for the lid section are formed by mechanical rolls to the desired curved section. A piano hinge affixed either inside or outside the trunk provides close adjustment of the lid when closed and permits it to be opened easily. The front also is hinged and swings down so that the contents may be removed quickly.

Sealed Against Moisture

Locks are joined to two bands of stainless steel, this material having proved more satisfactory than chromium-plated brass. Painting of the trunk involves the same treatment as that given to automobile bodies. Rubber is used to help seal the openings against penetration of moisture and to prevent rattles. Because of the nature of the service to which the automobile trunk is subjected, with air pressure generated at the rear of a moving car aiding to force rain into crevices, it is important that all joints be closed tightly. One leading manufacturer tests trunks with a water stream of 135 pounds pressure in order to disclose any leaks.

A large variety of sizes of automobile trunks is made necessary because of the different designs of cars. Popular types measure 36 to 40 inches long, 16 to 19 inches wide, 18 to 21 inches high. These are obtainable in colors to match the automobile. A typical trunk for a medium-priced car, such as shown in the accompanying illustration, requires 35 pounds of steel sheets in its manufacture in addition to several pounds of stainless and carbon steel for bands, hinges and locks.

Approves Specifications for Carbon Steel Castings

Consolidated specifications for carbon-steel castings for industrial, railroad, and marine uses recently were approved for publication as tentative by the American Society for Testing Materials on the recommendation of its committee A-1 on steel. Certain confusion had arisen due to the fact that the present specifications for carbon-steel castings had varying requirements for the same grades of steel. It was realized that the interests of producers and consumers would best be served if major requirements for identical grades were made uniform with exceptions for castings for certain special purposes.

The specifications apply to carbon-steel castings for miscellaneous and jobbing purposes, for locomotive and car equipment, and for ship construction. Two classes and five grades are provided for. Class A consists of one grade designated as special No. 1 for which no physical requirements are specified. Class B consists of four grades, regular, special No. 2, special No. 3 and special No. 4, for all of which physical requirements are specified (see also pages 30-34).

The steel is to be made by one or more of the following processes: Open-hearth, electric-furnace, converter, or crucible. Detailed requirements for heat treatment are included. The maximum carbon centent of class A castings is put at 0.45 per cent, with manganese 0.50-1.00; silicon, 0.20-0.75; maximum phosphorus, 0.05; maximum sulphur, 0.06 per cent. No carbon content is specified for class B castings inasmuch as physical requirements are given and the requirements for the other elements are the same as in the class A castings.

Promulgation of the consolidated specifications was in charge of a committee headed by R. A. Bull, consultant on steel castings, Chicago. Copies of the specifications can be obtained from A.S.T.M. headquarters, 1315 Spruce street, Philadelphia.

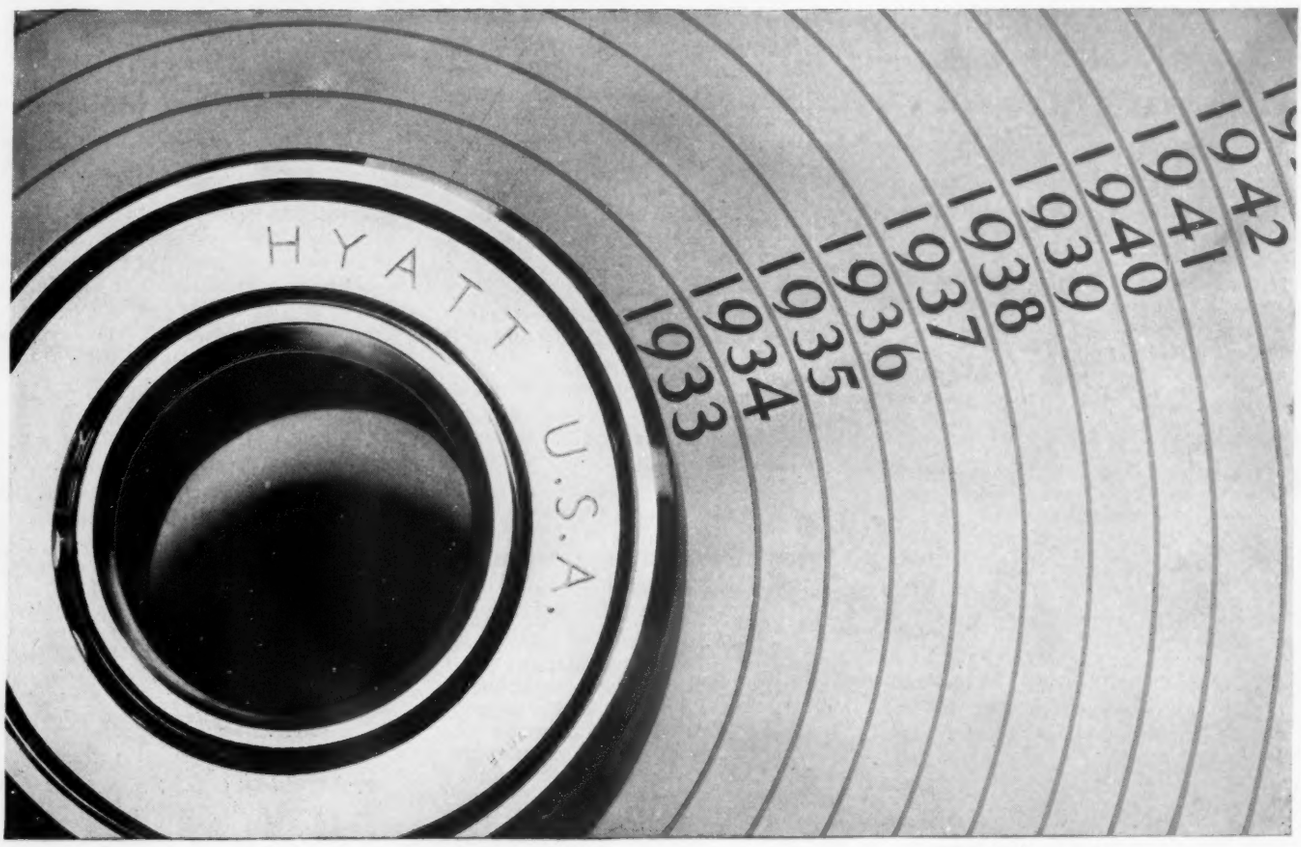
Rolling On to New Records of "WORK YEARS"

Year after year Hyatt Roller Bearings have returned the confidence which engineers have placed in them.

This is not alone because Hyatts have been modern in design, made from high grade steels and manufactured to rigid standards of quality.

It goes deeper—this long life expectancy. It comes from known performance over forty years—we call it Hyatt "work years."

Hyatts just roll on—giving no trouble and asking no quarter. Why not use them on your next job? Hyatt Roller Bearing Company, Newark, Detroit, Chicago, Pittsburgh, Oakland.



HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

NEW BOOKS WORTH READING

SCIENCE ◆ ECONOMICS ◆ BUSINESS

Technique of Purchasing Set Forth in New Volume

Industrial Purchasing, by Howard T. Lewis; cloth, 536 pages, 6 x 9 inches; published by Prentice-Hall Inc., New York, and supplied by STEEL, Cleveland, for $5, plus 15 cents postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This book is an official publication of the National Association of Purchasing Agents, and may be considered an official guide to the subject of purchasing. In its preparation the author had the close co-operation of the association and it is pointed out that every chapter has been read and revised by several specialists in each of the respective subjects under discussion.

The author first discusses the significance of the function of purchasing in the rehabilitation of business now under way. He also points to the relation of purchasing to various phases of business such as production, inspection, traffic, marketing, etc. The problem of centralization of purchases is discussed and the arguments for and against are considered. This is followed by a study of purchasing procedure.

◆

Textbook on Principles of Rolling Is Revised

Roll Pass Design, Volume I, second edition, by W. Trinks; cloth, 212 pages, 6 x 9 inches, seven tables 149 illustrations; published by Penton Publishing Co.; supplied by STEEL, Cleveland, for $4.50, plus 15 cents postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

In 1930, the author, who is the leading authority on the theory of roll design in the United States, issued two books on roll pass design, primarily for the use of his classes at Carnegie Institute of Technology. The text constituted a revision and enlargement of articles and classroom lectures presented by Prof. Trinks in 1929 and 1930.

The second edition of Volume I, which is just off the press, introduces many noteworthy refinements of the original text. The material has been revised, rearranged and amplified to take into account the advanced stage of present knowledge.

Chapter I deals with classification of rolls and nomenclature, discussion of the deformation process in rolling, problems of roll design, factors influencing roll pressure, stresses due to heating and cooling of rolls, "roll spring," deflection of rolls and factors determining the size of bar that can be rolled on a given roll.

In Chapter II the author summarizes basic principles governing entrance and deformation. He discusses laws of deformation, edging, sidedraft, factors which limit the amount of reduction, lateral spreading and shrinkage by cooling.

Chapter III is an exposition of principles underlying the processes of rolling. Forward slip, nonuniform reductions, overfills and fins, fillets and chamfers, convex box passes, sidework, side pressure, end thrust, arrangement of passes and slitting are a few of the many topics covered in this chapter.

Prof. Trinks has the faculty of presenting a complex subject in a way that holds the interest of students and beginners, yet at the same time is fully satisfactory to the most advanced engineers. He has succeeded admirably in weaving elementary instruction and advanced theory into a well-balanced continuity of text. For this reason the volume is equally suited to student engineers, roll designers, rolling mill equipment engineers and mill operating men.

Volume II, dealing with examples of series of actual roll passes with explanations for the shape of the intermediate passes, will be published about Jan. 1, 1934.

◆

Arc Welding Brought to Date In New Handbook

Procedure Handbook of Arc Welding Design and Practice, by Lincoln Electric Co.; flexible simulated leather, 434 pages, 5¾ x 9 inches; supplied by STEEL, Cleveland, for $1.50, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

The aim of this handbook is to present in one volume complete information on design and procedure for arc welding. It is encyclopedic in design and contents. Eight principal sections deal with important phases of arc welding and its application, amply illustrated with detailed drawings and photographic reproductions. Rapid advances in welding have made most books quickly obsolete and publication of this work is timely.

It is intended for the use of welders and department heads and also for those responsible for design of welded products. The sections cover methods and equipment; technique of welding; procedure, speeds and costs; structures and properties of weld metal; weldability of metals; designing for arc welded steel construction of machinery; design for arc welded fabrication of steel structures; typical application of arc welding in manufacturing, construction and maintenance.

◆

Displacement by Machines And Some Remedies

Displacement of Men by Machines, by Elizabeth Faulkner Baker; cloth, 284 pages, 6 x 9 inches; published by Columbia University press and supplied by STEEL, Cleveland, for $3.50, plus 15 cents postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This book probably records the first published effort dealing both with changing technology and labor displacement in representative plants and with the subsequent economic history of the men displaced. The author has chosen the printing industry upon which to base a study of the problem caused by mechanical innovations which always threaten skilled workers with economic disaster.

◆

Social Insurance Progress Traced in New Book

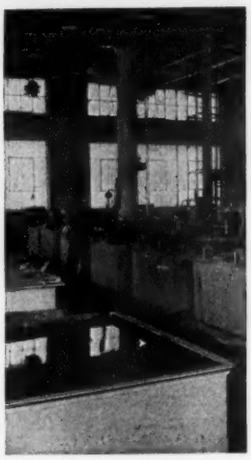
Job Insurance, by John Bertwell Ewing; cloth, 263 pages, 6 x 9 inches; published by the University of Oklahoma Press and supplied by STEEL, Cleveland, for $2.50, plus 15 cents postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

While European countries have gone a long way in the application of social insurance, in this country only one state, Wisconsin, has passed laws with the idea of protecting the worker against the hazard of unemployment. The Wisconsin unemployment compensation act, which went into effect July 1, 1933, attacks the problem from the standpoint of prevention. On the other hand a bill recommended by the Ohio commission on unemployment insurance, appointed by the governor, places emphasis on relief.

Other states are considering the problem, and at the same time numerous plans have been advanced by companies and groups.

Making the Most of

METHODS AND MATERIALS



LAYER annealing improves the multiple layer weld. Each layer refines the grain structure of the deposit beneath, but the last layer deposited does not possess good grain structure. Now a new electrode has been developed to handle this last layer. Without adding metal, it is claimed to provide the proper refining action rapidly and at little cost, furthermore, it smooths over inequalities and provides a weld of good appearance. It consumes itself entirely and can be used to anneal a line across metal for bending, braking, or for purposes in which a grain structure change is desired. This rod is made of reasonably high-carbon steel and has a low melting point. It is coated with manganese dioxide and potassium perchloride and an outer covering of nonhygroscopic magnesium silicate which keeps the inner covering from losing its properties. When the arc is struck, the oxidizing chemicals burn up the rod, leaving only the magnesium silicate slag over the deposited metal.

$ $ $

By using a strongly excess oxygen flame for both preheating and welding, when fusion welding bronzes which contain relatively high amounts of tin or lead, the tendency for those constituents to boil out is said to be eliminated.

$ $ $

AN ENGLISH gas utility is reported to have developed and patented a heat-treating process which eliminates scale formation and decarburization on any steel at any temperature. Even at temperatures as high as 1380 degrees Cent., such as are employed for the complex tungsten-cobalt steels, there is claimed to be no decarburization and a scale formation of only 0.0001 inch. The process has been used for hardening high-speed steel milling cutters, twist drills, reamers, dies, taps, hacksaws, chasers, and lathe tools; for hardening straight carbon tools of all descriptions; and for hardening strip steel and wire.

$ $ $

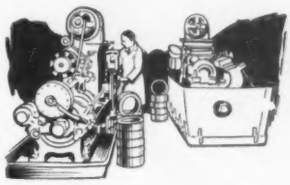
A test was conducted in an Illinois clay products plant to determine the value of hardfacing pug mill knives. Three knives were faced with ⅛-inch of stellite and put in service with new steel knives beside them. At the end of ten weeks the steel knives had worn down 1½ inches, whereas the hard-faced knives had worn but little and still retained their original length.

$ $ $

Monel metal scrap is being used extensively as a substitute for nickel in other forms as an alloying element in producing gray iron castings.

$ $ $

For machining certain nonferrous metals a large eastern company is using chromium plated tungsten carbide cutting tools. The chromium plate eliminates former trouble due



to sticking of the metal to the tungsten carbide. Another company plates the tools before they are tipped with the cutting alloy; the chromium plate in this case prevents the portion of the tool below the tungsten carbide from being gouged out.

$ $ $

A new tray has been perfected from which ice cubes frozen in mechanical refrigerators are easily and quickly removed without using water to loosen them. The tray consists of separate and removable sections made of 18-8 chrome-nickel stainless steel; these sections being flexible enough to bend easily and stiff enough to spring back to normal shape after the cubes are removed.

$ $ $

What appears to be reversion to ancient Chinese molding practice is indicated in a patent granted for brake shoe molds. The portion of the mold forming the back or gray portion is made of ground, fused silica bonded with fireclay, while the chilled face of the mold is formed either of metal or silicon carbide. The mold before use is baked and burned to make it withstand repeated use.

$ $ $

ADDITION of 0.50 per cent moylbdenum increases the high temperature and creep strength in steel so greatly that much thinner tubes can be used in boilers. The saving in weight due to thinner walls is enough to pay for the molybdenum addition. Notable economies have been effected with this type of boiler tube because of the added ease of heat conduction through the thinner walls.

$ $ $

Chromium coated castings gradually are finding wider applications. Powdered ferrochromium is placed on the surfaces of the mold and is taken up by the incoming metal, thus providing an alloyed surface coating high in chromium. The coating may be placed on one or both sides of the casting, depending upon the need for a heat or wear resisting coating. These castings do not replace those made of the solid, high-chromium alloy, but serve where there is a desire to replace steel castings with a slightly better material. For elevated temperature service, such as annealing boxes, chromium-coated castings have given about five to eight times the life of steel castings. They are used also for wear resistance in such applications as cast gear teeth, wobblers, coupling boxes and the like.

$ $ $

Experience points to the fact that corrosion of welded galvanized pipe is not a matter for consideration. Welds may be made with either steel or bronze welding rods, the choice being principally a matter of economics and appearance. With a bronze available which will permit welds of better than 55,000 pounds per square inch strength, there is no reason to question the bronze welded joint structurally, at least for the more ordinary services for which galvanized pipe is used. Oxyacetylene fusion welded joints already are well known for the high strength which they present.

MACHINE TOOLS UNDER NRA

THE year has seen a substantial improvement in the machine tool trade. The low point reached was in March. Since that time orders have increased to the highest point in 20 months.

A large share of current business is the natural result of increased activity and employment in industrial fields. Repairs and replacements upon machines formerly idle are becoming increasingly necessary.

Higher wages and shorter hours under the NRA should increase, and not decrease, the necessity for modern, efficient equipment. There will, of course, be no return to hand-labor and the burdensome tasks from which the machine has freed mankind.

Moreover, changes in product specifications, due to new engineering development or shifting public tastes, may give rise to a demand for new machine tools.

Certainly the revival of markets for metal-working machinery and capital goods is as essential to general recovery as is the quickening of consumers' goods markets.

For many years the plants of the Interlake Iron Corporation have supplied foundry coke and pig iron for machine tool castings.

INTERLAKE IRON CORPORATION

PIG IRON - COKE

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Analysis of Factors Influencing

Rolling Pressure and Power Consumption In the Hot Rolling of Steel

BY SVEND EKELUND

Translated by BENGT BLOMQUIST

Part IV—Rolling Pressure and Torsional Moment

(Seventh and Concluding Article of Series)

THE horizontal projection of the area of contact between bar and rolls is: $b_m \cdot x_0$; which is approximately

$$b_m \cdot \sqrt{R(h_1-h_2)}$$

Hence, the rolling force will be:

$$P=p_v \cdot b_m \cdot x_0=p_v \cdot b_m \sqrt{R(h_1-h_2)} \quad \text{.....(42).}$$

Since the calculation can be based upon the deformation force solely in the direction of rolling, without introducing any appreciable error, p_v will be expressed by the following relation:

$$p_v=p(1+m)=\left(\sigma+\epsilon\frac{2v_h}{h_{1m}+h_{2m}}\right)(1+m)$$

In most cases, the "bite" causes a shock, which means that in reality the maximum rolling force momentarily may exceed P.

v_h represents the mean value of the vertical compression velocity.

v represents the peripheral speed of the roll.

Then:

$$v_h \doteq v \cdot 2 \sin\frac{\phi_1}{2} \doteq v\sqrt{\frac{h_1-h_2}{R}}$$

In this connection, it may be mentioned that if the rolling is thought to be carried out in such a way that the bar is pulled forth between the rolls, the tensile force required will be:

$$K \doteq P \cdot 2 \sin\frac{\phi_1}{2} \doteq P\sqrt{\frac{h_1-h_2}{R}} = p_v \cdot b_m(h_1-h_2)$$

where p_v is a function of R.

From this it follows also that the rolling work for one pass can be written as:

$$A=p_v \cdot b_m \cdot l_2(h_1-h_2)$$

The expression $b_m \cdot l_2(h_1-h_2)$ may be considered as the displaced volume. Inasmuch as the horizontal forces on the roll surface must equalize each other, the resultant rolling force will be directed vertically.

In order to determine the torsional moment, it is necessary to know the point on the surface of contact at which the resultant force is applied. In Fig. 16, x_p is the distance to the point of application of the resultant rolling force, $x\psi$ is the distance to the point at which the horizontal forces are in equilibrium. We may assume that x_p and $x\psi$ are nearly equal, so that:

$$\int_0^{x_p}(p+p_x(dx=\int_{x_p}^{x_0}(p+p_{x_1})dx \quad \text{..(43).}$$

The influences of velocity and spreading accordingly are neglected. Then

$$p_x=\frac{4}{3}p[c_1x^2+c_2x]$$

$$p_{x_1}=p\,\frac{x_0-x}{h_2}$$

These expressions are substituted in equation (43), and the equation is integrated to provide the relation:

$$x_p+\frac{4}{9}c_1x_p^3+\frac{2}{3}c_2x_p^2=x_0-x_p+\frac{1}{2h_2}(x_0-x_p)^2 \quad \text{.....(43a).}$$

By testing this equation for different reductions on various dimensions, it is found that $x_p \doteq x_0/2$. Accordingly, the torsional moment for two rolls will be:

$$M_s=p \cdot x_0=p_v \cdot b_m \cdot R(h_1-h_2) \quad \text{....(44).}$$

The moment of the bearing friction at the roll necks is:

$$M_f=P \cdot \mu_t \cdot d \quad \text{.....(45).}$$

where μ_t represents the co-efficient of roll neck friction and d represents the diameter of the roll necks.

However, when plain bearings are used, an additional bearing friction will be encountered if the bushings are set up against the roll body in order to stabilize the rolls axially. This frictional moment may vary in different cases, and will be included in the idle running moment. The idle running moment also will depend upon the pressure with which the bearings are tightened to the necks in the vertical direction. As this pressure is considerably less than the rolling force, it will have no influence upon the torsional moment and the roll neck loads during the rolling.

Disregarding the idle running moment, the total torsional moment is:

$$M_v=M_s+M_f=P(x_0+\mu_t \cdot d) \quad \text{.....(46).}$$

From this relation,

$$\frac{M_f}{M_v}=\frac{1}{1+\frac{x_0}{\mu_t \cdot d}} \quad \text{.....(47).}$$

which expresses the share of the neck friction in the torsional moment. If the expression for P is substituted in equation (46), then:

$$M_v=P(x_0+\mu_t \cdot d)$$
$$=p(1+m) \cdot b_m[R(h_1+h_2)+\mu_t d\sqrt{R(h_1-h_2)} \quad \text{.....(48).}$$

M_v is the torsional moment on the rolls, without regard to the idle running moment M_f or the increased frictional moment M_k for pinions and drive machinery. Inasmuch as M_k is usually $0.10 \cdot M_v$, the total torsional moment for the whole mill is:

$$M+M_s=1.10 \cdot M_v+M_f \quad \text{.....(49);}$$

where M represents the moment of the driving machinery and M_s represents

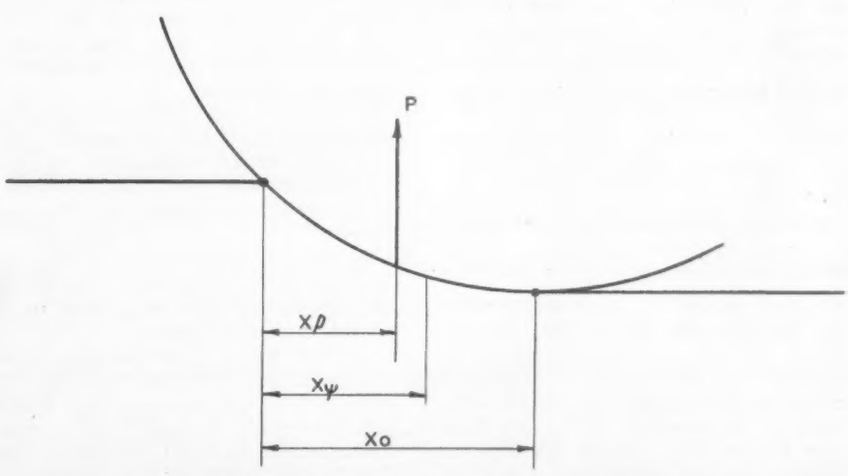

Fig. 16—Point of application of the roll pressure

the moment of the flywheel and other rotating parts.

The coefficient of neck friction in a structural mill has been determined as $\mu_t = 0.11$. This value was computed from the idle running torque, when the roll neck loads were known. In general, the coefficient of friction has been calculated as 0.10 to 0.15 for bearings with good lubrication, while for old open-type bearings μ_t becomes as great as 0.20 to 0.25. The reason for the coefficient of friction being as high even as 0.10, is that the design of the bearings does not provide for effective sealing, so that dust and scale are permitted to enter the bearings, rendering the lubricant unserviceable and abrading necks and bushings. Since the bearing friction causes a considerably increased consumption of power, the bearing problem in rolling mills is of great importance. In high-speed mills rolling small sections, roller bearings should be appropriate.

Table XII

Frictional Losses in Mill Roll Bearings

	Mill		
	Blooming	Plate	Sheet
Roll diameter — D inch	23.62	27.56	19.69
Neck diameter — d inch	13.78	19.69	13.78
Reduction — $(h_1 - h_2)$ inch	1.18	0.197	0.0039
M_t for $\mu_t = 0.10$	27	55	88
M_r for $\mu_t = 0.25$	46	75	95

(100%)

In Table XII a few examples have been compiled which show the part played by bearing friction. The figures have been calculated according to equation (47).

Especially in sheet rolling, the frictional losses in the bearings are high, because the reduction is small. By decreasing μ_t from 0.25 to 0.10, the total work of rolling is reduced in the ratio 2.4:1, and the idling work also decreases.

By applying equations (44) and (48) to available test results, and especially to Puppe's tables, it has been possible to determine the compressive strength σ and the constant of viscosity ϵ for steel as follows:

$$\sigma = (20{,}164 - 7.89\, t_F)\ (1.4 + C + Mn) \text{ pounds/square inch} \quad (50);$$

$$\epsilon = 0.01\ (20{,}164 - 7.89\, t_F) \text{ pounds sec./square inch} \quad (51);$$

in which:

t_F = temperature, degrees Fahr.
C = carbon content, per cent
Mn = manganese content, per cent

These formulas are most nearly valid for temperatures above 1500 degrees Fahr., and for a manganese content of less than 1 per cent. The compressive strength depends upon the carbon content up to a certain point, and upon the temperature, determined by the carbon content, above which the material in question seldom is hot rolled.

It is evident that equations (48) and (44) are valid for passes other than rectangular, if due consideration is given to the shape of the section. Thus, the formulas can be applied to diamond, square, oval, gothic and round passes, provided that the frictional influence and the relative velocity of compression are based upon the mean height of the section. Accordingly, we can write:

$$m = \frac{1.6\mu\sqrt{R(h_1 - h_2)} - 1.2(h_1 - h_2)}{h_{1m} + h_{2m}} \quad (52)$$

and $$p = \sigma + \epsilon\, \frac{2\, v_h}{h_{1m} + h_{2m}} \quad (53);$$

where h_m represents the mean height of the section. The mean height h_m bears the following relations to the maximum height h in passes of different shapes:

0.63 h for gothic passes.
0.55 h for diamond passes.
0.79 h for round passes.
0.67-0.85 h for oval passes (the lower value for smaller sections which fill the pass).
0.55-0.65 h for square passes (the lower value for smaller sections which fill the pass).

For the rolling of shapes, the formulas check well if h_{1m} and h_{2m} are substituted for h_1 and h_2 at all places. For most shapes, the surface of contact against the roll can be determined not only by the maximum height of the section, but with greater accuracy by the mean height.

Summary

The conditions which prevail in the region of contact between the rolls and the material have been investigated, and the following conclusions have been obtained:

1. There is no difference in principle, with regard to the distribution of forces, whether the material is compressed between the curved roll surfaces or between plane, parallel surfaces.

2. The horizontal forces due to friction are directed opposite each other, and are in equilibrium at one point on the surface of contact.

3. This point of equilibrium is located on the front part of the surface, and is the point around which compression takes place. The movement of the material relative to the roll is determined by the location of this point; so that the material will move more slowly than the roll, causing slippage opposite to the direction of rolling, in the zone of contact up to this point, and more rapidly than the roll, causing slippage in the direction of rolling, in the area in front of this point (the direction of rolling being considered as the forward direction). The latter slippage causes the forward slip.

4. The rolls act upon the material only by pressure.

5. Assuming plane parallelopipedal compression, in combination with the friction influence, it has been possible to follow the course of the internal deformation in a comparatively simple manner, and to integrate the work required for this deformation.

6. Inasmuch as the friction in the surfaces of contact is of fundamental importance for the entire rolling process, the influence of friction has been investigated in greater detail. The real compressive strength of the material is obtained by multiplying the "ideal" strength, including the effect of velocity, by a friction factor.

7. The spreading is determined directly from the frictional forces.

8. By knowing the distribution of forces, the point of application of the rolling force has been determined, together with the torsional moment, because the rolling force is directed vertically.

9. The compressive strength σ, and the constant of viscosity ϵ, have been determined, as functions of the temperature and of the composition of the rolled material (for ordinary grades of steel), by applying the derived formulas to available data on the rolling work and rolling force.

10. The formulas are valid for all of the ordinary pass sections.

11. The formulas for rolling force and torsional moment are general, because they have been derived, as far as possible, with regard to every influencing factor.

* * *

At the end of his article Mr. Ekelund has carried out numerical computations for a number of passes, showing the applicability of the formulas. However, inasmuch as the examples are fictional, this part is of little interest and has been omitted. It will be of more value, for anyone who wishes to use the formulas for calculations of rolling forces, torque, and power consumption, to have a compilation of the derived relations. Therefore:

A. Rolling Force

$$P = b_m\sqrt{R(h_1 - h_2)}\left[1 + \frac{1.6\mu\sqrt{R(h_1 - h_2)} - 1.2(h_1 - h_2)}{h_1 + h_2}\right] \cdot \left[\sigma + 2\,v\epsilon\,\frac{\sqrt{\frac{h_1 - h_2}{R}}}{h_1 + h_2}\right]$$

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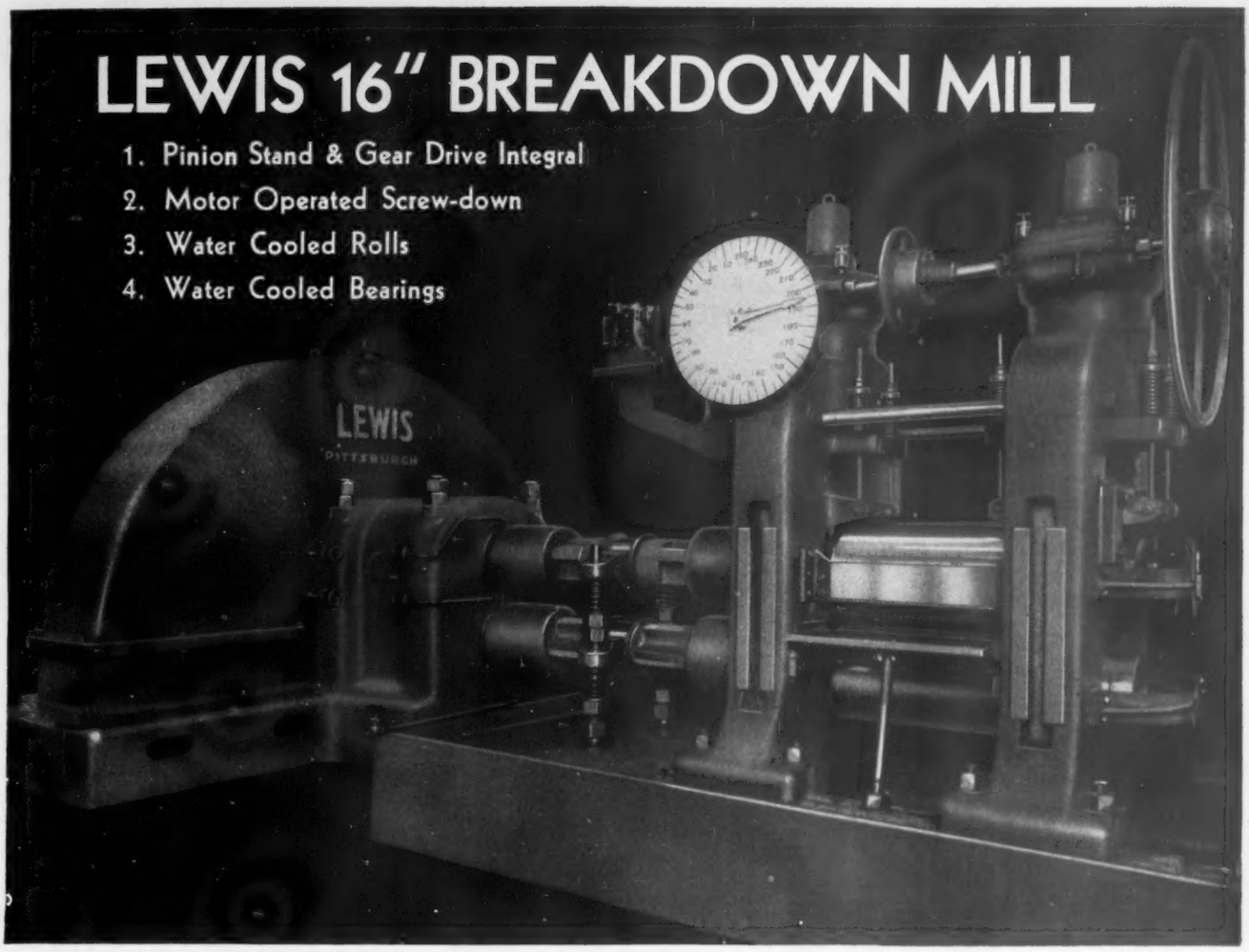

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in which:

P = rolling force in pounds

R = roll radius at the bottom of the pass, inches

b_m = mean width of the bar, inches, determined by the relations:

$$b_m = \frac{b_1 + b_2}{2}$$

For sections other than rectangular, $b_m = \frac{b_{1m} + b_{2m}}{2}$

where $b_{1m} = A_1/h_1$; $b_{2m} = A_2/h_2$

A_1 = cross-sectional area of the bar before the pass, square inches.

A_2 = cross-sectional area of the bar after the pass, square inches.

h_1 = height of the bar before the pass, inches.

h_2 = height of the bar after the pass, inches.

μ = coefficient of friction between the bar and steel rolls, determined by the relation:

$$\mu = 1.06 - 0.000278\ t_F$$

This relation is valid for temperatures above 1300 degrees Fahr. For chilled iron rolls, $\mu = 0.8\ (1.06 - 0.000278\ t_F)$.

σ = compressive strength of the material, pounds square inches, determined from the relation:

$\sigma = (20{,}164 - 7.89\ t_F)\ (1.4 + C + Mn)$, where C = carbon content, per cent; Mn = manganese content, per cent.

This relation is valid for temperatures above 1500 degrees Fahr.

ϵ = constant of viscosity, pounds sec/square inches, determined by the equation:

$$\epsilon = 0.01\ (20{,}164 - 7.89\ t_F);$$

valid for temperatures above 1500 degrees Fahr.

v = circumferential speed of the rolls at the bottom of the pass, inches/sec.

B. Torsional Moment

M_s = torsional moment of the rolling force for two rolls

$$= \frac{P}{12} \sqrt{R(h_1 - h_2)} \text{ foot pounds}$$

M_f = bearing friction torque for two rolls

$$= \frac{P}{12} \cdot \mu_t \cdot d \text{ foot pounds}$$

in which: μ_t = coefficient of neck friction, d = roll neck diameter, inches.

M_T = idle running moment of the mill, foot pounds

M_v = torsional moment of the rolls considered, without regard to the increased friction moment in pinions and other transmission elements, foot pounds

M_k = increased frictional moment of the pinions and other transmission elements during rolling, foot pounds.

M_m = motor torque, foot pounds.

M_a = torque of the rotating masses, foot pounds.

ΣM = total torque of the mill, foot pounds.

$M_v = M_s + M_f$

$M_k = 0.10\ M_v$

$M_m + M_a = 1.1\ (M_v + M_T)$

$$\Sigma M = M_m + M_a = M_T + \frac{1.1\ P}{12} \left[\sqrt{R(h_1 - h_2)} + \mu_t d\right]$$

C. Power Consumption

n = rolling speed, revolutions per minute.

N = horsepower required for rolling.

$$= \frac{n \cdot \Sigma M}{5252} HP.$$

If several passes are operating simultaneous, ΣM_v is introduced in the formulas.

Remarks

The validity of the "Ekelund formula" depends to a great extent upon the values of the compressive strength σ, the constant of viscosity ϵ, and the coefficient of friction μ, which are all physical constants. The formula expressing σ as a function of the temperature and of the chemical composition, and the equations expressing ϵ and μ as functions of the temperature, have been derived by Mr. Ekelund from empirical data pertaining to average rolling conditions. For steel of medium and higher carbon content, and for ordinary rolling temperatures, the rolling forces calculated according to the formula check well with measured values; but for extremely low-carbon steels, the calculated values are generally lower, especially for the last passes.

More recent investigations have provided a possible explanation for these discrepancies (see *Stahl und Eisen*, Jan. 3, 1929, "Die Rekristallization beim Warmwalzen" by Tafel, Haneman and Schneider; also the investigation by Siebel and Fangmeier on hot rolling, published in Paper No. 159 "Mitteilungen aus dem Kaiser-Wilhelm Institut fuer Eisenforschung"). The compressive strength σ, depends upon the rate of recrystallization (or grain size), in such a way that the lower the recrystallization rate, the higher the compressive strength. The rate of recrystallization is considerably decreased at the A_3 point, where γ-iron is transformed into the α-phase, resulting in a noticeably increased strength of the steel in this temperature interval. Since the A_3 line in the iron-carbon diagram runs from approximately 1650 degrees Fahr. for pure iron to 1274 degrees Fahr. for 0.85 per cent carbon steel, the temperature at which the decrease in rate of recrystallization begins will be lowered accordingly; so that the rolling of medium and high-carbon steel will be finished before the compressive strength of the steel has begun to be affected by the change in the rate of recrystallization. Furthermore, the higher the carbon content is, the less noticeable will the increase in strength at the critical temperature become, because the amount of cementite increases. This also explains why the influence of the change in recrystallization rate upon the rolling force is negligible in the rolling of ordinary steels. The formula for the compressive strength will give $\sigma = 0$ for $t_F = 2552$ degrees Fahr. In the iron-carbon diagram, the value $\sigma = 0$ will thus be represented by a horizontal line. It would be more correct theoretically to have $\sigma = 0$ coincide with the solidus line. The compressive strength then could be expressed as follows:

$\sigma = (22{,}012 - 3697\ C - 7.89\ t_F)\ (1.4 + C + Mn)$ pounds per square inches.

The influence of alloys on the compressive strength of steel at high temperatures has not been studied to the extent of providing a basis for a formula. However, it has been found for chromium steel that the second bracket in the formula above can be written as:

$$(1.4 + C + Mn + 0.3\ Cr);$$

and the values of rolling force thus calculated have checked fairly well with measured values.

The "Ekelund formula" in its present form is of unquestionable value, and it is to be hoped that Mr. Ekelund's analysis of the rolling conditions may cause investigations to be directed into such channels that accurate means of calculating the rolling force for all cases of hot rolling will be established.

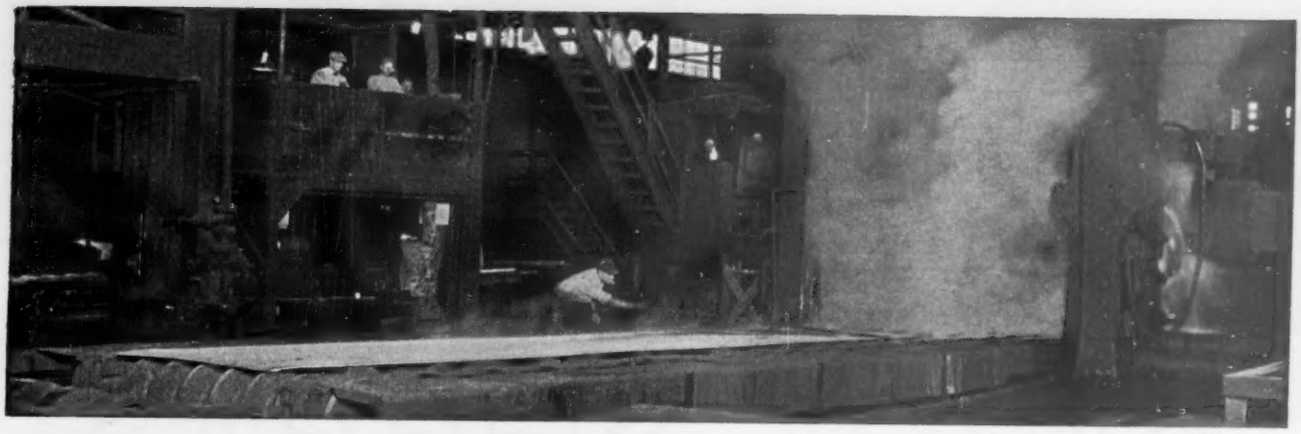
Will Introduce New Type Of Magnetic Equipment

Ferrous Magnetic Corp., New York, consulting engineer, and manufacturer of magnetic inspection equipment for laboratory and mill inspection of ferrous metals and alloys, soon will announce a new type of magnetic equipment said to differ radically in both method and design from any known today. Being compact and sturdily constructed the device is expected to withstand severe abuse.

According to the manufacturer's claims, the machine will for the first time comprise full automatic operation with controlled signaling, indicating and recording features. Mechanical operation has been simplified to the extent that mill labor may be employed for inspecting and grading materials. One of the equipments now is being installed in a steel mill.

Lists Data on Cupolas

A list of 37 suggestions in regard to the efficient operation of foundry cupolas has been drawn up by the Ironton Firebrick Co., Ironton, O., manufacturer of refractories, and is being circulated to foundries. Copies are available upon request to the company.



PROGRESS IN STEELMAKING

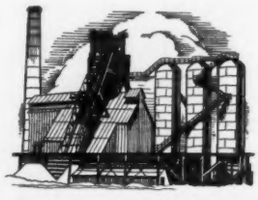
SPACER rolls, which lie beneath and between the working rolls, and above and between the top train of working rolls are a feature of a recently developed roller leveler. Pressure can be applied to the center of the sheet toward both edges simultaneously, or toward one or the other edge, depending on the design of the unit. The backing-up rolls extend the full length of the working rolls, thus permitting sheets to be leveled and the deflection controlled over the full width of the machine. Easy adjustment for angling the top train of rolls as well as indicating gages are provided.

♦ ♦ ♦

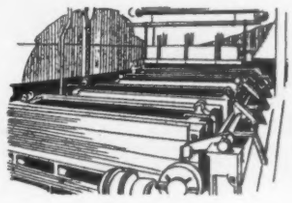
Steel tubes containing 5 per cent chromium have been found highly satisfactory for refrigerator coils because of their resistance to corrosion in actual service.

♦ ♦ ♦

Internal back pressure or resistance to gas flow in open-hearth furnaces is claimed to be reduced 15 to 25 per cent by the installation of recently marketed checker brick.



ELECTRIFYING the operation of skips and large and small bells at blast furnaces in this country has afforded the interlocking of the complete charging system such as the coke screens, weigh hoppers, skip cars, revolving hopper, bells and gage rods. By this arrangement only one man is required in the stockhouse, compared with two and frequently three under ordinary practice. The operator of the scale car, merely by throwing a single switch, may actuate machinery that will fill a skip with ore and two or three skips with coke and dump them into the receiving hopper at the top of the furnace without added attention.



ACID-PROOF vitreous block and a new white acid-proof cement have been developed for lining pickling tanks. The cement holding the blocks is reinforced with steel wire or expanded metal welded to the inner surface of the tank. The lining has all the acid and chemical resisting characteristics of porcelain and offers maximum resistance to abrasion.

♦ ♦ ♦

Desirable features associated with machines employed for eliminating stretcher strains in sheet metal now have been incorporated in a single unit. In operation, a sheet is fed between hold-back rolls and into the gap of pinch rolls which draw it into the machine. Once the sheet is in the grip of the pinch rolls, the work roll automatically is shifted above the plane of travel. This causes the sheet to go into a loop. The double bending or flexing of the steel as it passes in and out of the loop kneads the metal and imparts the desired amount of cold plasticity. The greater the degree of which the working for cold plasticity is carried out, the longer the period of reversion during which the metal may be stamped without the formation of stretcher strains. The progressive advancement of the bend throughout the area of the sheet followed by a pass through a roller leveler, permits the flexing to be carried further beyond the elastic limit of the steel than heretofore has been possible by a roller leveling machine, thus affording greater freedom from stretcher strains.

♦ ♦ ♦

Improving the lubrication of old-style open-neck cold mill bearings is effected easily, according to an authority on lubrication. The necks should be machined and polished thoroughly; bearings must be finished properly. If the lubricant is to be distributed from grooves or pockets, these should be finished and chamfered to a close tolerance. The proper wedge shape between the neck and the chamfer facilitates delivery of the lubricant between the neck and the bearing. Under heavy service the bearing metal should be supported by brass grids and the thrusts by inserts of bronze. Loose fitting chucks should be shimmed to facilitate the alignment of neck and bearing assemblies under heavy stresses.

IN MAKING open-hearth rimming heats an operator in the Great Lakes district adds stick aluminum to the ladle, the amount being contingent upon the percentage of iron oxide in the slag which is tested prior to the spiegel addition. The aluminum helps to compensate for variations in the percentage of iron oxide in the slag and with addition of some aluminum to the mold, aids in controlling the rimming action.

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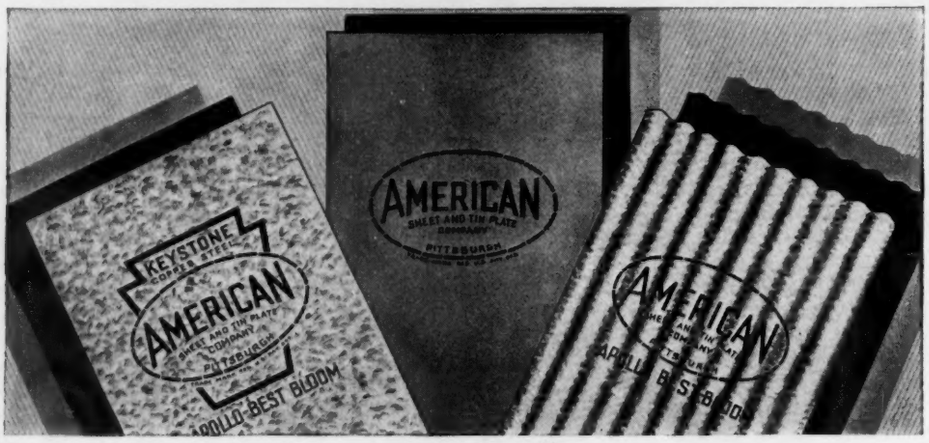

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SCANNING THE FIELD OF TECHNOLOGY

A Digest of Important Developments Pertaining to the Production, Processing, Application and Performance of Steel

Carbon Steel

By H. E. Publow and T. D. Parker, in engineering experiment station bulletin No. 53, Michigan State College of Agriculture and Applied Science, East Lansing, Mich.; 16 *pp.*, 13 *ills.; price* 25 *cents.*

This bulletin is the report of an investigation of the structure of carbon steel at elevated temperatures and under reduced pressure. It is stated that specimens of steel heated to temperatures well above the upper critical range reveal two grain formations, which have different points of focus when viewed under high magnification. It is suggested that these structures likely are records left of two distinct volume changes. This change did not appear as a wave passing over the surface of the metal but appeared rather as fine lines gradually becoming more distinct as the temperature was raised.

—STEEL, 10-2-33

Golden Gate Bridge

By James Reed, in Western Machinery and Steel World, September, p. 259, 4 *pp.*, 16 *ills.*

Summary of essential engineering characteristics of Golden Gate bridge at San Francisco, which will have the longest single clear span in the world —4200 feet—and a total bridge length of 6450 feet. Of the suspension type, the structure will have two main cables, each 36½ inches in diameter and 7660 feet long between anchorages, with a combined load supporting capacity of 430,000,000 pounds. Each cable weighs 11,000 tons and contains 27,572 separate wires. The finished structure will account for about 100,000 tons of steel. Four years will be required to complete the job. Some construction views of cable anchorages and tower piers are presented.

—STEEL, 10-2-33

Manual on Data

Published by American Society for Testing Materials, 1315 *Spruce street, Philadelphia,* 45 *pp.*, 19 *ills.*, 14 *tables, with tables of squares and square roots.*

Sponsored by A. S. T. M. committee E-1 on methods of testing, this manual has been prepared to correlate and make available in convenient form some of the principles of efficient presentation of data. The manual discusses the application of statistical methods to the problems of (1) condensing information contained in a set of observations and (2) presenting the essential information in a concise form more readily interpretable than the unorganized mass of original data. Attention is directed particularly to quantitative information on measurable characteristics of materials and manufactured products.

—STEEL, 10-2-33

Malleabilization

By R. Schneidewind and A. E. White, in engineering research bulletin No. 24, *University of Michigan, Ann Arbor, Mich.;* 56 *pp.*, 23 *ills.*, 19 *tables, photomicrographs; price* $1.

Summary on the subject of malleable iron and description of experimental work carried out to determine the changes occurring during the course of transformation of white iron to malleable iron. Individual factors which affect the rate of malleableizing are examined, among which are: Temperature of annealing, silicon and carbon contents, the atmosphere within the annealing furnace and the temperature of superheating of the molten iron.

—STEEL, 10-2-33

Testing Machine

The Foundry, September, p. 38, 1 *p.*, 4 *ills.*

Construction and operating details of the reputed world's largest testing machine, installed at the University of California, Berkeley, Calif. The machine will test in compression up to 4,000,000 pounds and in tension up to 3,000,000 pounds. Total height is nearly 47 feet; weight 475,000 pounds. Special attention is devoted to a description of various steel castings which figure prominently in the construction of the unit.

—STEEL, 10-2-33

Drawing, Extrusion

By Harold F. Shepherd, in Machine Design, p. 24, 3 *pp.*, 6 *ills.*

Ninth in a series of articles considering design problems from the production standpoint. Drawing, extrusion and pressing operations are studied in this installment.

—STEEL, 10-2-33

18-8 Alloys

By John A. Mathews, in Metal Progress, September, p. 13, 6 *pp.*, 3 *ills.*, 1 *table.*

Discussion of alloy modifications of the well known 18-8 chrome-nickel steel. Effects of additions of silicon, tungsten, molybdenum, titanium and other elements are considered. In conclusion the stability of the 18-8 alloy structure is discussed.

—STEEL, 10-2-33

Scrapping Plants

Bulletin issued by the Austin Co., Cleveland, 8 *pp.*

Reasons why the scrapping of obsolete plants is patriotic, economical and profitable. In line with current agitation at Washington, it is pointed out that economic recovery is impossible without some stimulus to the capital goods industries. Scrapping old plants provides such a stimulus.

—STEEL, 10-2-33

Steel in Breweries

By H. D. Edwards in Brewery Age, September, p. 54, 3 *pp.*

Suitability of 18-8 stainless steel for use in brewery equipment, with suggested applications including barrels, storage tanks, cooling coils, vats, siphons, yeast pans, piping and the like. Mechanical advantages and adaptability of the steel are cited (see STEEL, March 27, p. 11).

—STEEL, 10-2-33

Alloy Directory

Third edition, issued as a supplement to the September issue of Machine Design, 32 *pp.; price separate,* 25 *cents.*

The revised edition of this directory of iron, steel and nonferrous alloys used in the design of machines contains 225 separate listings of alloys, alphabetically by trade names. Alloys also are classified by properties.

—STEEL, 10-2-33

Grinding Auto Parts

By Edward S. Heck, in Abrasive Industry, October, p. 6, 3 *pp.*, 7 *ills.*

How grinding methods have been adapted to the successful production of free wheeling mechanisms and gears for dual-ratio transmissions, used on Auburn automobiles. Uniform maintenance of close tolerances is required for nonselective assembly.

—STEEL, 10-2-33

Heat Treatment

By David C. Zuege, in Nickel Steel Topics, August, p. 2, 2 *pp.*, 1 *ill.*

Differential heat treatment of alloy steel castings, to provide a combination of wear resistance and toughness. Examples of various parts so treated are presented.

—STEEL, 10-2-33

NEW EQUIPMENT

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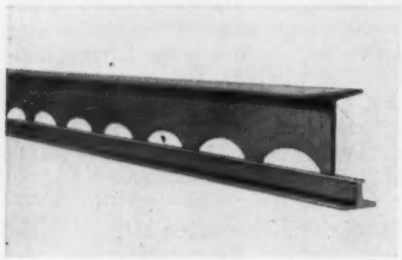
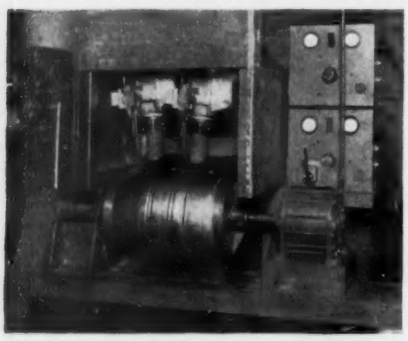
Arch Beam Fills Need for Self-Supporting Rail

Cleveland Tramrail division of Cleveland Crane & Engineering Co., Wickliffe, O., has developed an arch beam rail, shown herewith, designed



Cleveland Tramrail 8-inch arc beam is self-supporting rail

to fill the need for a self-supporting unit that will carry loads up to and including two tons. The rail has a depth of 8 inches. Where it is possible to attach supporting fittings to existing trusses or columns no superstructure is required on spans of 20 feet or less. The arch beam rail is built of a half section of a structural beam, from the web of which



Lincoln machine welds barrels by shielded arc process

semicircular sections have been punched at close intervals to form a series of arches. This beam is welded to a standard Tramrail rail.

◆

Unit Welds Beer Barrels by Shielded Arc Process

Lincoln Electric Co., Coit and Kirby roads, Cleveland, has developed an automatic machine for welding beer barrels by the shielded arc process. The unit, equipped with an automatic welding head, has a production capacity of 30 or more barrels per hour. Machines may be supplied with single or double welding heads, as shown in the accompanying illustration. This depends upon whether the barrels have one or two circumferential seams to be welded. Although operating within a few inches of each other, neither arc disturbs nor affects the other. Welding heads are stationary, the barrels being revolved under the arc as the welding progresses. Arc welded beer barrels usually are designed for either lap or butt welding.

◆

New Wire Rope Socket Has Three Simple Parts

American Steel & Wire Co., 208 South La Salle street, Chicago, has placed on the market a device known as the Fiege wire rope socket, shown

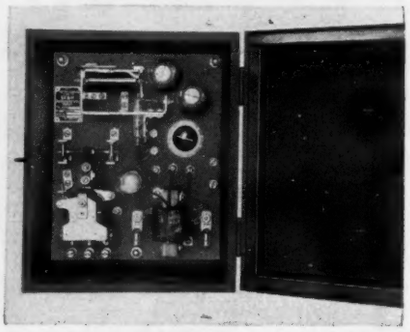
Wire rope socket marketed by American Steel & Wire Co.

herewith. Only three simple parts, a socket, sleeve and a plug, comprise the unit. These are attached in a minimum of time without the necessity for flame or hot metal. The manufacturers offer this product to make the task of socketing wire rope safe, simple and easy.

◆

Automatic Timer Provides Uniformity in Welds

Electric Controller & Mfg. Co., 2700 East Seventy-ninth street, Cleveland, has announced an automatic weld timer for use in connection



EC & M automatic timer for resistance welding machines

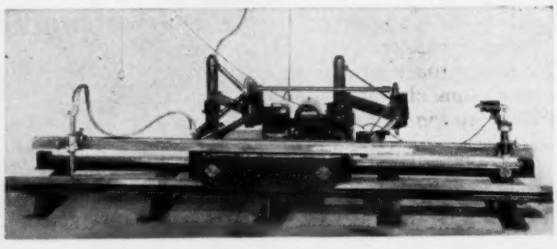
with resistance welding machines. This timer, shown herewith, does not provide a definite amount of time for each weld, but varies the time in inverse proportion to the rate of current flow to produce an efficient weld with each operation. The unit consists of a rectifier tube which charges a fixed condenser in proportion to the rate of the current flowing in the welding circuit. When the charge reaches an amount sufficient to pass current through two neon gas-filled tubes, a small relay is operated which in turn opens the relay controlling the main line contactor.

◆

Traveling Oxygraph Cuts Steel Plates and Slabs

Air Reduction Sales Co., Lincoln building, New York, recently placed on the market a traveling oxygraph which embodies an outstanding development in flame cutting machines. As shown herewith, the mechanism consists essentially of a carriage that supports a pantograph assembly, in addition to suitable driving and control mechanism, a tracing bar carrying a tracing device, and machine cutting torch. All are mounted on a stationary track. The unit may be employed for cutting large steel

TRAVELING oxygraph developed by Air Reduction Sales Co. for cutting large steel plates and slabs



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(Names of users on request)

●

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plates and slabs requiring cutting over extended areas. In the traveling oxygraph the base as well as the arms travel.

◆

Improvements Made in Line of Chart Instruments

Brown Instrument Co., Philadelphia, recently developed a new line of 8 and 12-inch circular chart instruments including thermometers, shown herewith, in indicating and recording types for temperatures from -40 degrees Fahr. up to 1200 degrees Fahr., and indicating or recording pressure and vacuum gages for ranges from 10 inches of water up to 5000 pounds. All types are offered in one, two or three-pen models. The improved mercury-filled helix on the thermometer line is built of stainless steel which will withstand

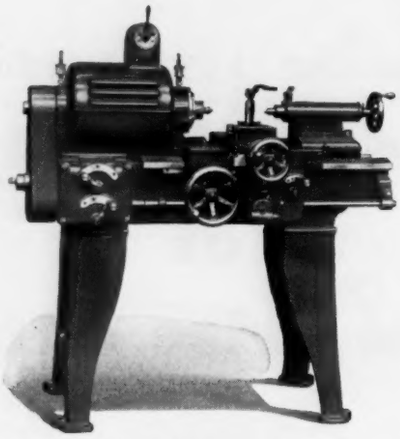
Brown thermometer is one of new circular chart instruments

100 per cent overload and provides a surplus of power to move the pen. Gas and vapor type helices are made of heat treated phosphor bronze.

◆

Lathe Designed for Rapid Production Work

R. K. LeBlond Machine Tool Co., Cincinnati, is offering a new pro-



LeBlond 11-inch high-speed motor head production lathe

duction lathe designed for high speeds, rugged enough to withstand the strains of frequent starting and stopping and the resultant shock from excessive tool impact. The unit, shown herewith, is especially desirable for turning small shafts; also for such materials as bronze, babbitt, bakelite, aluminum and white metal. Multispeed motor armature is mounted on the spindle which can be brought to top speed in two seconds and stopped in one and a half seconds. Both cross and length feeds are controlled by a single feed clutch. Feed box provides for nine feed changes, all of which may be obtained readily by use of two levers.

◆

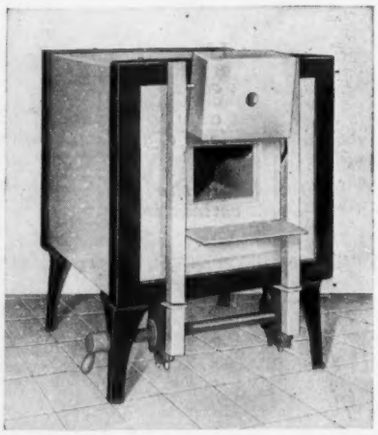
Planer Type Milling Machine Has Noteworthy Features

William Sellers & Co. Inc., 1600 Hamilton street, Philadelphia, recently developed the planer type milling machine shown herewith. The large machine tool has four independent unit heads and will accommodate work 120 x 90 inches x 29 feet. Another feature is the built-in circular scale which eliminates the large open slot for carrying brackets for micrometer dials. Cross rail is of the extended back type and is equipped with powerful air locks. The table is driven by a spiral gear drive which in conjunction with an adjustable speed motor and a change gear box, give the necessary feeds and traverse. All motors are controlled from one panel. Feed motors can not be started until the heads selected for operation actually are rotating. Each head has its own lubricating system consisting of pressure pump and reservoir.

◆

Muffle Furnace Is Sturdy, Compact in Design

Cooley Electric Furnace Co., 47-32 Van Dam street, Long Island City, N. Y., recently developed a muffle furnace designated type MP, shown herewith. Uses include experimental testing, enameling, heat treating,



Cooley muffle furnace employs Doreco electric heating element

fusions, ignitions, etc. Particularly noteworthy among design feature is the use of the Doreco heating element. A band of insulating refractory material is interposed between the elements and the front heads which forms a small vestibule and cuts the flow of heat, protects the front head, and when combined with the plug type door, virtually eliminates cold areas. An arrangement of a toggle and flexible rack operated by a conveniently located handle moves the door into any desired position. These furnaces are designed for interchangeable connections to either 110 or 220 volt circuits, the change from one voltage to the other being affected by a simple jumper connection at the furnace terminals. Units are designed for continuous operation at 1750 degrees Fahr., and for intermittent operation at 1850 degrees Fahr.

SELLERS planer type milling machine. Circular scales built into each head show amount of projection on quill at all times

Labor Vexes as Specifying, Contracting Gain

Users Stock Heavily—Protection Broad Prior to New Prices—Steel Rate Off 2 Points to 38%—Coal Strike and Code Lifting Coke Prices—Bethlehem Gets Tunnel Segments

ALREADY harassed by enormous complications in writing contracts under the new code and pressed to ship material specified against expiring, low-price contracts, producers of steel last week passed under the deepening shadow of labor difficulties.

Automotive consumers without exception, partsmakers largely financed by them, and other users in lesser degree ordered out steel which, when delivered, will make consumers' stocks as a whole the largest since 1929.

These inventories, motivated originally by advancing mill prices, appear the more attractive as the labor situation becomes more tense and threatens a possible interruption of production and foreshadows further price increases. Oct. 15 is the official deadline on these shipments, but an extension is probable.

Meanwhile, users of bars, plates and shapes, with automotive interests still dominant, last week were placing their fourth quarter requirements on the old basis of 1.60c, Pittsburgh, prior to the Sept. 30 advance of $2 in plates and shapes and $3 in bars.

Offered four forms of contract, each ironclad, the trade generally favored a commitment for a percentage of requirements within a stated maximum. Firm extras and differentials disturbed users more than higher bases. The industry, now being a unit, the market is a seller's one.

The influx of specifications, which producers put on their mills immediately, held last week's decline in operations to 2 points, the rate being 38 per cent. Had production not been retarded by strikes in the Wheeling and Pittsburgh districts, the rate would have held at 40 per cent.

Youngstown, Chicago Mills Operate Higher

Youngstown mills gained 6 points to 54 per cent, and Chicago 4 to 48. Cleveland was steady at 54 and Buffalo at 48. But Pittsburgh slipped 4 points to 30 per cent, eastern Pennsylvania 4 to 31½, Wheeling 16 to 56, New England 11 to 75, Birmingham 16 to 34, and Detroit 9½ to 45. Henry Ford threatens to reopen his steelworks.

While agitators succeeded in closing many departments of the mill at Weirton, W. Va., were picketing some Carnegie mills in the Pittsburgh district, and fomenting trouble at other plants, including Detroit, steel's chief difficulties originated in fuel. Striking miners were attempting to disaffect western Pennsylvania steelworkers, while rises of $1 to $1.50 per ton in coke seemed the certain sequel to the higher coal prices announced late last week. Coal has been moved from Alabama to Pittsburgh recently.

Apart from the hypodermic administered by expiring contracts and rising prices, the iron and steel markets are more active, in some measure traceable to government-financed projects. Bethlehem Steel Co. has won the competition for 51,800 tons of castings for the midtown tunnel in New York. Cleveland has placed 12,000 tons of cast iron pipe, with 6000 tons to come. Sacramento, Calif., votes Nov. 7 on a water project requiring 20,000 tons of plates.

Structural Awards in Big Spurt

California highway commission has let projects taking 1200 tons of shapes and 800 tons of bars. Ohio river barge inquiries, involving 12,000 to 15,000 tons of plates, have been revived. Bids have been opened at Chicago on Mississippi river dams and Great Lakes breakwaters taking 25,000 tons of steel, Inland Steel Co. being awarded 7809 tons. Structural awards last week totaled 26,981 tons, a big improvement.

New business in pig iron is light in view of previous contracting, but shipments continue heavy. Many melters have held up shipments of scrap, due to strikes for one reason, and the market is easy and nervous. Buying of Japan, Poland and Italy in the eastern markets has mildly offset weakness as far inland as Pittsburgh. Prospects are that this will be a 25,000,000-ton ore year on the Great Lakes, 7 times 1932.

Rail mill executives this week may submit prices on a tonnage, loosely estimated at 700,000, for the railroads, to be partly financed by the government. An accompaniment would be 30 per cent of the tonnage in fastenings. The trade talks of a $2 reduction in the present $40 price.

This week new levels on plates, shapes, bars, strip and some grades of sheet are in effect. Cold-finished bar and ferroalloy prices have been extended. Rail steel bars are up $2. Advances also are noted in refined iron bars, and staybolt and engine bolt iron. Gary is now a pipe base.

The net effect is to lift STEEL's iron and steel composite 37 cents to $31.60, the iron and steel composite 70 cents to $49.20. The scrap index, however, is off 13 cents to $10.58.

COMPOSITE MARKET AVERAGES

	Sept. 30	Sept. 23	One Month Ago Aug., 1933	Three Months Ago June, 1933	One Year Ago Sept., 1932	Ten Years Ago Sept., 1923
Iron and Steel Composite	$31.60	$31.23	$30.04	$28.73	$29.32	$44.64
Finished Steel Composite	49.20	48.50	47.50	45.30	47.50	68.05
Steelworks Scrap Composite	10.58	10.71	11.57	9.55	7.04	16.15

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods, tin plate, nails, sheets, plates, shapes, bars, and black pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Sept. 30, 1933	Aug. 1933	June 1933	Sept. 1932
Finished Material				
Steel bars, Pittsburgh	1.75	1.60	1.60	1.60
Steel bars, Chicago	1.65	1.70	1.70	1.70
Steel bars, Philadelphia	2.04	1.91	1.91	1.91
Iron bars, Chicago	1.60	1.65	1.65	1.65
Shapes, Pittsburgh	1.70	1.60	1.60	1.60
Shapes, Philadelphia	1.90½	1.81½	1.65	1.70
Shapes, Chicago	1.65	1.70	1.70	1.70
Tank plates, Pittsburgh	1.70	1.60	1.55	1.60
Tank plates, Philadelphia	1.88½	1.79½	1.49½	1.79½
Tank plates, Chicago	1.65	1.70	1.70	1.70
Sheets, No. 10 blue anneal., Pitts.	1.75	1.65	1.65	1.70
Sheets, No. 24, hot ann., Pitts.	2.25	2.25	2.10	2.10
Sheets, No. 24, galvan., Pitts.	2.85	2.85	2.70	2.75
Sheets, No. 10 blue anneal., Gary	2.00	1.90	1.80	1.80
Sheets, No. 24 hot ann., Gary	2.35	2.35	2.25	2.20
Sheets, No. 24 galvan., Gary	2.95	2.95	2.85	2.85
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Wire nails, Pittsburgh	2.10	2.10	1.85	1.95
Tin plate, per base box, Pitts.	4.65	4.25	4.25	4.75
Semifinished Material				
Sheet bars, open-hearth, Youngs.	26.00	26.00	26.00	26.00
Sheet bars, open-hearth, Pitts.	26.00	26.00	26.00	26.00
Billets, open-hearth, Pittsburgh	26.00	26.00	26.00	26.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00

	Sept. 30, 1933	Aug. 1933	June 1933	Sept. 1932
Pig Iron				
Bessemer, del. Pittsburgh	19.26	18.26	17.26	15.76
Basic, valley	17.00	16.00	15.00	14.00
Basic, eastern, del. eastern Pa.	18.19	17.38	16.19	13.75
No. 2 foundry, del. Pittsburgh	18.76	17.76	16.76	15.76
No. 2 foundry, Chicago	17.50	17.00	16.00	15.50
Southern No. 2, Birmingham	13.50	13.00	12.00	11.00
No. 2X, Eastern, del. Phila.	18.63	17.88	16.76	14.26
Malleable, valley	17.50	16.50	15.50	14.50
Malleable, Chicago	17.50	17.00	16.00	15.50
Lake Superior charcoal, del. Chi.	23.54	23.04	23.04	23.04
Gray forge, del. Pittsburgh	18.38	17.13	16.63	15.63
Ferromanganese, del. Pittsburgh	87.24	87.24	73.24	73.24
Scrap				
Heavy melting steel, Pitts.	$12.75	13.75	11.65	9.50
Heavy melting steel, eastern Pa.	10.50	12.00	9.50	7.25
Heavy melting steel, Chicago	9.75	10.40	9.25	5.75
No. 1 wrought, eastern Pa.	11.00	13.00	10.25	7.25
No 1 wrought, Chicago	9.25	10.35	8.10	5.60
Rails for rolling, Chicago	11.25	11.25	10.25	7.00
Coke				
Connellsville, furnace, ovens	2.50	2.75	1.80	2.00
Connellsville, foundry, ovens	3.25	3.10	2.40	2.75

CURRENT FINISHED STEEL PRICES

Prices conform to American Iron and Steel institute schedules. Asterisk denotes price change this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

Pittsburgh, base	1.75c
*Gary, base	1.85c
*Chicago, del.	1.885½c
*New York, del.	2.08c
*Phila., del.	2.04c
*Birm., base	1.90c
St. Louis, del.	2.09c

HOT ROLLED ANN. No. 10

Pittsburgh, base	1.90c
*Gary, base	2.00c
*Chicago, del.	2.03½c
*Phila., del.	2.19c
*New York, del.	2.23c
St. Louis, del.	1.99c
*Birm., base	2.05c
*F.o.b. cars, dock Pacific ports	2.42½c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.25c
Gary, base	2.35c
Chicago, del.	2.385c
*New York, del.	2.58c
*Phila., del.	2.54c
Birm., base	2.40c
St. Louis, del.	2.59c
F.o.b. cars, dock, Pacific ports	2.95c

GALVANIZED No. 24

Pittsburgh, base	2.85c
Gary, base	2.95c
Chicago, del.	2.985c
*Phila., del.	3.14c
*New York, del.	3.18c
Birm., base	3.00c
St. Louis, del.	3.19c
San Fran., f.o.b. cars, dock	3.55c

TIN MILL BLACK No. 28

Pittsburgh, base	2.50c
Gary, base	2.60c
St. Louis, del.	2.84c

COLD ROLLED No. 10

Pittsburgh, base	2.30c
Gary, base	2.40c
*Philadelphia, del.	2.59c
*New York, del.	2.63c

COLD ROLLED No. 20

Pittsburgh, base	2.75c
Gary, base	2.85c
*Philadelphia, del.	3.04c
*New York, del.	3.08c

ENAMELING SHEETS

*Pitts., No. 10	2.45c
Pitts., No. 20	2.90c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh

Tin plate, coke base, contract	$4.65
Do., stock	4.05
Long ternes, No. 24 unassorted	2.90c

Gary base, 10 cents higher.

Corrosion, Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel sheets, 35c; plates, 31c; bars, 28c.

	A	B	C	D
Bars	19c	20.5c	23c	28c
Plates	21c	22.5c	25c	30c
Sheets	26c	27.5c	30c	35c
Hot Strip	19c	20.5c	23c	28c
Cold Strip	25c	26.5c	29c	34c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 18/23% inc., D over 23/30%.

Steel Plates

*Pittsburgh, base	1.70c
*New York, del.	1.98c
*Phila., del.	1.88½c
*Boston, del.	2.10c
*Buffalo, del.	1.93½c
*Chicago, base	1.75c
*Cleveland, del.	1.88½c
*Birm., base	1.85c
*Coatesville, base	1.80c
*Sparrows Point, base	1.80c
*Pac. Coast, f.o.b. cars, dock	2.25c
St. Louis, del.	1.89c

Structural Shapes

*Pittsburgh, base	1.70c
*Philadelphia, del.	1.90½c
*New York, del.	1.95½c
*Boston, del.	2.08½c
*Bethlehem, base	1.80c
*Chicago, base	1.75c
*Cleveland, del.	1.88½c
*Buffalo, base	1.80c
*Birm., base	1.85c
*Pac. Coast, f.o.b. cars, dock	2.25c
*Do., wide flange	2.35c

Bars

SOFT STEEL

*Pittsburgh, base	1.75c
*Chicago, base	1.80c
*Birm., base	1.90c
*Buffalo, base	1.85c
Pac. Coast ports, cars, dock, c.i.f.	2.10c
*Cleveland, base	1.80c
*Philadelphia, del.	2.04c
*Boston, del.	2.19c
*New York, del.	2.08c
*San Fran., f.o.b. cars, dock	2.30c
Pitts., forg. qual.	1.85c

*RAIL STEEL
To Manufacturing Trade

Pittsburgh	1.65c
Chicago	1.70c
Cleveland	1.70c
Gary, Ind.	1.70c
Buffalo	1.75c

IRON

Chicago, base	1.60c
Philadelphia, base	1.60c
*Pitts., refined	2.70c to 7.50c

REINFORCING
New billet

Pittsburgh, cut lengths	1.90c
Chicago, Youngstown, O., Birmingham, Ala., Cleveland, Buffalo	1.95c
Gulf ports	2.20c
Pacific coast ports	2.35c
*Phila., del.	2.19c

Rail steel

Pittsburgh, base	1.75c
Chicago, Buffalo, Cleveland, Gary, Ind., Youngstown, O.	1.80c
Gulf ports	2.15c
Pacific coast ports	2.30c

Wire Products □ □

(Prices apply on carload lots. Mixed carloads 10 cents higher; joint carloads up 20 cents; less carloads up 30 cents. Nail extras subject to 10 per cent discount on straight or mixed carload shipped to single consignee.)

Base, Pitts.-Cleve.
(Per 100 lb. keg)

Standard wire nails	$2.10
Cement coated nails	2.10
Galvanized nails	3.60

(Per pound)

Polished staples	2.80c
Galvanized fence staples	3.05c
Barbed wire, gal.	2.60c
Annealed fence wire	2.25c
Galvanized fence wire	2.60c
Woven wire fencing (base column, c.l.)	$55.00

(To Manufacturing Trade)

Plain wire, 6-9 gage	2.10c

Anderson, Ind., and Chicago, $1 over Pitts.-Cleve.; Duluth, $2 higher; Birmingham, Ala., $3 higher.

Spring wire	3.10c

Chicago and Waukegan $1 higher. Worcester $2 higher.

Cold-Finished Bars □

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs	1.95c
20,000 to 59,999 lbs.	1.90c
60,000 to 99,999 lbs.	1.85c
100,000 lbs. and over	1.82½c

Chi., Cleve., Buff., 5c up; Detr., 20c up; East. Mich., 25c up.

Shafting □ □

(Turned and ground)
Cumberland, Md., base

1⅛-inch	3.25c
1 3/16 to 1½-inch	2.75c
1 7/16 to 1 7/8-inch	2.60c
1 15/16 to 2⅞-inch	2.45c
2 15/16 to 6-inch	2.30c

Alloy Steel □ □

Hot rolled, f.o.b. Pittsburgh, Buffalo, Chicago and Massillon, O., 2.45c. F.o.b. Bethlehem, Pa., 2.55c.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.30
2500	2.25	3400	3.20
4100 .15 to .25 Mo.			0.50
4600 .20 to .30 Mo. 1.25-1.75 Ni.			1.05
5100 .80-1.10 Cr.			0.45
5100 Cr. spring			0.20
6100 bars			1.20
6100 spring			0.95
Cr., Ni., Van.			1.50
Carbon van.			0.95
9250 (flats)			0.25
9250 (rds., sq.)			0.50

Strip, Hoops, Bands □

Hot-rolled strip up to 23 15/16-in. wide, Pitts.	1.75c
* Do., Chicago	1.85c
* Do., del. Phila.	2.04c
* Do., del. N. Y.	2.08c
Cooperage hoop, Pittsburgh	1.75c to 1.85c
* Do., Chicago	1.95c
*Cold-rolled strip Pitts., Cleve.	2.40c
*Worcester, 3 tons or over	2.60c

Rails, Track Material □

Stand. rails, mill	$40.00
Relay rails, Pitts. (Gross Ton)	
20-45 lbs.	$24.50
50-75 lbs.	$20.00
80-100 lbs.	$23.50
Light rails, billet qual., Pitts., and Chicago	$32.00
Do., reroll, qual.	$31.00
Angle bars, mills	2.55c
Spikes, R. R., Pitts.	2.40c
Track bolts, base	3.40c
Tie plates, Pitts.	1.90c
Tie plates, Chi.	1.90c

Base, railroad spikes 200 kegs or more; base tie plates, 20 tons or more; differentials for less.

Base, light rails, 25 to 40 pounds; 50 to 60 pounds inclusive, $5 extra; 16 and 20 pounds, $1 extra; 12 pounds, $2 extra; 8 and 10 pounds, $5 extra.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chi. Discounts to legitimate jobbing or large consuming trade for full-case lots, Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread	73 off
Rolled thread, ½ x 6 and smaller	73 off

MACHINE BOLTS

All sizes, cut thread, lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts without nuts	73 off
Tire bolts	60 off
Stove bolts, 72½-25-10 off in pkgs.; 85 off in bulk, 5000 or more of a size.	
Rolled thread machine bolts, ½ x 6 and smaller, 73 off	
Step Bolts	70 off
Elevator bolts	70 off

NUTS

Semifinished	73 off

HEXAGON CAP SCREWS

Milled	85 off
Upset 1-in., smaller	85-10 off

SQUARE HEAD SET SCREWS

Upset, 1-in., smaller	80 off
Upset, larger than 1-in.	80 off
Headless set screws	75-10 off

Rivets, Wrought Washers

Struc. c.l., Pitts-Cleve.	2.50c
Struc., c.l., Chi.	2.60c
7/16-in. & smaller, Pitts., Chi., Cleve.	70, 10 and 5 off

*Wrought washers, mill 6.00 off

Cut Nails, Piling □

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more; no discount on size extras	$3.00
Do., less than 5 kegs; no discount on size extras	$3.15
Steel piling, Pitts.	1.90c
Steel piling, Buff.	2.00c
Steel piling, Chi.	2.00c

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Gary, Ind., Lorain, O., to consumers in carloads. Indiana Harbor, Ind., and Evanston, Ill., 2 points less. Chicago delivered, 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD

Steel

In.	Blk.	Gal.
¼ and ⅜	57	38½
½	62	50½
¾	65½	55½
1—3	67½	58½

Iron

½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

LAP WELD

Steel

2	63½	54½
2½—3	66½	57½
3½—6	68½	59½
7 and 8	67½	57½
9 and 10	67	57

Iron

2	37	22½
2½—3½	38	25
4—8	40	28½
9—12	38	24½

LINE PIPE

Steel

⅛-inch, butt weld	50½
¼—⅜, butt weld	56
½, butt weld	61
¾, butt weld	64½
1—3, butt weld	66½
2-inch, lap weld	62½
2½—3, lap weld	65½
3½—6, lap weld	67½
7—8, lap weld	66½
9—10, lap weld	66
11—12, lap weld	65

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe list. 8—12 inch no extra. 2-inch line discount unchanged from list prior to April 15, 1933.

BOILER TUBES

C. L. Discounts, f.o.b., Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3¾	50	3	17
4	52	3¼—3½	18
4½—6	42	4	20
1½	1	4½	21

On lots of a carload or more, above base discounts subject to preferential of two 5 per cent discounts on steel and 10 per cent on charcoal iron.

Lap Welded Steel—Under 10,000 pounds, 6 points under base and one 5 per cent; on 10,000 pounds to carload, 4 points under base and two 5 per cents. Quantity discounts, same as for hot rolled below. Charcoal Iron—Under 10,000 pounds; 2 points under base; on 10,000 pounds to carload, base and one 5 per cent.

STANDARD COMMERCIAL SEAMLESS BOILER TUBES

Cold Drawn

2—2¼	27	3¼—3½	44
2½—2¾	34	4	46
3	41	4½, 5, 6	36

(On 1—1¾-inch sizes mechanical tubing discounts apply.)

Hot Rolled

2—2¼	33	3¼—3½	50
2½—2¾	40	4	52
3	47	4½, 5, 6	42

Quantity discounts are: Under 10,000 pounds, 10 points and 5 per cent; 10,000 to 24,999 pounds, 6 points and 5 per cent; 25,000 pounds to carload, 2 points and 5 and 5 per cent; carload and over, base discount and 5 and 5 per cent. No extra for lengths up to and including 24 feet. Sizes smaller than 1 inch and lighter than standard gage to be held at mechanical tubes list and discount.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

*100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe □

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$35.00-36.00
4-in., Birm.	38.00-39.00
4-in. Chicago	46.40-47.40
6 to 24-in. Chicago	43.40-44.40
6-in. & over, N. Y.	34.50-36.50
4-in. New York	36.50-38.50

Class A pipe $3 over Class B. Stand. fitgs., Birm. base, $90.00

Six to 24-inch, fittings, base; over 24-inch plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, $5 higher.

RAW MATERIAL PRICES

Prices conform to American Iron and Steel institute schedules. Asterisk denotes price change this week

Iron Ore

LAKE SUPERIOR ORE
Gross ton, 51½%, Lower Lake Ports

Old range bess.	$4.30
Mesabi bessemer	4.65
Old range nonbess.	4.65
Mesabi nonbess.	4.50
High phosphorus	4.40

EASTERN LOCAL ORES
Cents, unit, del. E. Pa.

Foundry and basic, 56-63%, con.(nom.)	8.00- 9.00
Cop-free low phos. 58-65% (nom.)	10.00-10.50

FOREIGN ORE
Cents per unit, f.a.s. Atlantic ports (nom.)

Foreign manganiferous ore, 45-55% iron, 6-10% man.	8.50
No. Afr. low phos.	7.00
Swedish basic, 65%	8.00
Swedish lo wphos.	8.50
Spanish, No. Afr. basic, 50 to 60%	7.00
Tungsten, spot, sh. ton unit, duty pd.	$12.25-12.50
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton c.i.f.	$17.00-18.00

Manganese Ore

(Nominal)

Prices, not including duty, cents per unit, cargo lots.

Caucasion, 52-55%	22.00
So. African, 52%	21.00-22.00
So. Afr., 49-51%	20.00-21.00
Indian, 48-50%	nominal

Refractories

FIRE CLAY BRICK
Per 1000 f.o.b. Works
First Quality

Pa., Ohio, Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	48.00

Second Quality

Pa., Ohio, Ill., Ky., Md., Mo., Ga., Ala.	40.00

MALLEABLE BUNG BRICK

All bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet E. Chicago	54.00
Birmingham, Ala.	55.00

MAGNESITE BRICK
Per Net Ton, 9 x 4½ x 2½

Burned	$65.00
Unburned	55.00

CHROME BRICK
Per Net Ton

F.o.b. ship. point	$45.00

MAGNESITE

Dead burned grain, Chester, Pa., Baltimore bases, net	40.00
Domes, Chewelah, Wash., base	22.00

Fluorspar

85 and 5 per cent grade

Washed gravel, duty paid, tide, gross ton	$20.00
Washed gravel f.o.b. Ill., Ky., net ton, carloads	$14.00

Semifinished Steel

Prices Per Gross Ton

BILLETS AND BLOOMS
4 x 4-inch base

Pitts., Chi., Cleve., open-hth. & bess.	$26.00
*Philadelphia	31.30
Forging, Pitts., Chi.	31.00

SHEET BARS

Pitts., Cleve., Yong.	26.00
Chicago	26.00
Canton, O.	26.00

SLABS

Pitts., Cleve., Yong.	26.00

WIRE RODS

Pitts., Cleveland	$35.00
Chicago	36.00

SKELP

All grades, Pitts. and Chicago	1.60c

Coke

Price Per Net Ton

BEEHIVE OVENS

Connellsville fur.	$2.50- 2.75
Connellsville fdry.	3.25- 3.50
(Above prices are nominal)	
Connell. prem. fdry.	4.50
New River fdry.	6.00
Wise county fdry.	4.25- 5.00
Wise county fur.	3.50- 4.25

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.71- 9.31
Chi. ov., outside del.	8.00
Chicago, del.	8.75
New England, del.	10.50
St. Louis, del.	8.25
Birmingham, ovens	4.50
Indianapolis, del.	8.75
Ashland, Ky., Connells., basis	5.50
Portsmouth, ovens, Connell. basis	5.50
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.00
Philadelphia, del.	

Ferroalloys

(In dollars, except Ferrochrome)

Ferromanganese, 78-82% tidewater, duty pd.	82.00
del. Pitts.	87.24
Spiegeleisen, 19-20%, dom., fur., spot†	27.00
Ferrosilicon, 50%, frieght all., c. l.	74.50
Do, less carload	82.50
Do, 75 per cent	120-130.00
Spot, $5 a ton higher.	
Silicomang., 2½ carb.	85.00
2% carbon	90.00
1% carbon	100.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	9.50
Do, spot del.	10.00
*Ferrotungsten, stand., lb. cont.	0.94-1.00
Ferrovanadium, 35 to 40%, lb. cont., on analysis	2.60- 2.80
Ferrotitanium, c.l., prod. plant, frt. allow., net ton	137.50
*Spot, 1 ton, frt., all., lb.	7.00
*Do, under 1 ton	7.50
Ferrophosphorus, per ton, c. l. 17-19%, Rockdale, Tenn., basis; 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 50-60%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads. Quan. diff. apply.

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25

Gross Tons

	No. 2 Fdry.	Malleable	Basic	Bessemer
Basing Points:				
Bethlehem, Pa.	$17.50	$18.00	$17.00	$18.50
Birdsboro, Pa.	17.50	18.00	17.00	18.50
Swedeland, Pa.	17.50	18.00	17.00	18.50
Sparrows Point, Md.	17.50	18.00	17.00	18.50
From Swedeland, Pa., del. to Phila.	18.26	18.76	17.76	.....
From Bethlehem, del. to Brooklyn..	19.77	20.27	.....	.....
From Bethlehem, del. to Newark, N. J.	18.99	19.39	.....	.....
Basing Point:				
Everett, Mass	18.00	18.50	17.50	19.00
From Everett, del. to Boston, flat rate, with surcharge	19.00	19.50	18.50	20.00
Basing Point:				
Buffalo	17.50	18.00	16.50	18.50
From Buffalo, del. to Boston	19.00	19.50	18.50	20.00
Basing Points:				
Neville Island, Pa.	18.00	18.00	17.50	18.50
Sharpsville, Pa.	17.50	17.50	17.00	18.00
Youngstown, O.	17.50	17.50	17.00	18.00
From Neville Island, Pa., del. to Pittsburgh	(Neville Island base, plus 50 to 76 cents switching charges)			
Basing Points:				
Erie, Pa.	17.50	18.00	17.00	18.50
Cleveland	17.50	17.50	17.00	18.00
Toledo, O.	17.50	17.50	17.00	18.00
Detroit	17.50	17.50	17.00	18.00
From Detroit, del. to Saginaw, Mich.	19.60	19.60	19.10	20.10
From Cleveland, del. to Akron, Canton, O.	18.76	18.76	18.26	19.26
From Toledo, del. to Mansfield, O.	19.26	19.26	18.76	19.76
Basing Point:				
Hamilton, O.	17.50	17.50	17.00	18.00
From Hamilton, del. to Cincinnati	18.51	18.51	18.01	19.01
Do., del. to Indianapolis	19.77	19.77	19.27	20.27
Basing Points:				
Duluth	18.00	18.00	.....	18.50
Chicago	17.50	17.50	17.00	18.00
Granite City, Ill.	17.50	18.00	17.00	.....
From Duluth, del. to St. Paul	19.94	19.94	.....	20.44
From Chicago, del. to Milwaukee	18.50	18.50	18.00	19.00
From Chicago, Toledo or Detroit, del to Muskegon, Mich.	20.40	20.40	19.90	20.90
From Granite City, del. to St. Louis	(Granite City base, plus 50 to 75 cents switching charges)			
Basing Point:				
Birmingham, Ala.	13.50	.....	12.50	.....
From Birmingham del. to:				
Boston	18.62	.....	18.12	.....
Newark, N. J.	18.51	.....	.....	.....
Brooklyn, N. Y.	19.39	.....	.....	.....
Baltimore	18.02	.....	17.52	.....
Cleveland	19.64	.....	18.64	.....
Cincinnati	18.23	.....	17.11	.....
Chicago	18.16	.....	19.14	.....
St. Louis	18.05	.....	17.05	.....
Basing Point:				
Provo, Utah	16.50	.....	.....	.....

LOW PHOS.

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$22.00. Basing point: Johnson City, Tenn.—	.....
Philadelphia, standard and copper bearing	23.13

GRAY FORGE		CHARCOAL	
Valley furnace	17.25	Lake Superior fur.	20.50
Pitts. dist. fur.	17.75	Do., del. Chicago	23.54

SILVERY

Jackson County, O., base: 6%—$22.25; 7—$23.25; 8—$24.25; 9—$25.25; 10—$26.25; 11—$27.75.

BESSEMER FERROSILICON

Jackson County, O., base: 10%—27.25; 11—$28.75; 12—$30.25; 13—$1.75; 14—$33.25; 15—$34.75; 16—$36.25.

Bars

Higher Prices in Effect—Buying Last Week Heavy To Anticipate New Level

BAR PRICES, PAGE 56

Pittsburgh—Contracting at 1.60c, Pittsburgh, in hot-rolled merchant steel bars was especially active last week, before the advance effective Oct. 2 went into effect. No advance is contemplated in hot-rolled alloy steel bars, and 2.45c, Pittsburgh, stands. Effective Oct. 2, rail steel bars to have manufacturing, or merchant, trade were advanced $3 a ton. The new Pittsburgh base, therefore, is 1.65c. No change has been made in cutting, size, or other extras. This advance follows a similar one in rail steel bars for reinforcing purposes, and in new billet steel. Other basing point prices on rail steel bars for the manufacturing trade, all incorporating $3 increase are: Cleveland, Chicago and Gary, Ind., 1.70c; Buffalo, 1.75c. A leading producer of refined iron bars in Pittsburgh is quoting, since Oct. 2, a range of 2.70c to 7.50c. Another similar producer here has posted the following prices to be effective Oct. 2 on certain refined iron bar products. Staybolt iron 7.25c per pound and engine bolt iron, 5.75c. On low phos-melting bar, $70 per gross ton has applied since Oct. 1.

Cleveland—Contracting for fourth quarter at 1.65c, base, Cleveland, was heavy during the week. Practically all consumers who could estimate requirements covered. The advance of $3 a ton became effective Sept. 30. Of the three forms of contracts offered by producers the most popular is that known as No. 3, requiring a customer to give a mill a percentage of his requirements, not exceeding a stated maximum tonnage, divided into three monthly installments. Specifications must be furnished in ample time to permit the mill to complete final shipments not later than Dec. 31. If a consumer should fail to specify the tonnage as provided in the monthly installments, he loses his claims to the material. If he gives one-half his requirements to one mill, and half to another, he must distribute his specifications in the same ratio. This form so far has been applied only to plates, shapes and bars.

Chicago—Bar consumers have been active in covering fourth quarter requirements before the advance of $3 a ton effective this month. While soft steel bars now are 1.80c, Chicago, with rail steel bars 1.70c, prices $3 a ton lower originally had been announced and buyers had the privilege until the end of September to contract at these figures.

New York.—Commercial steel bar consumers are fairly well covered on fourth quarter requirements at 1.60c, Pittsburgh, which gave way Sept. 30, to a $3 advance. Owing to confusion over new contract regulations, several days will be required in ironing out some details.

Philadelphia—Most contract consumers of commercial steel bars covered for fourth quarter at 1.60c, Pittsburgh, which prevailed up to Sept. 30, when the $3 advance went into effect. This was in spite of complications which arose as a result of the new contract forms under the code.

Boston. — Commercial steel bars were more active last week with most consumers covering against the $3 advance for fourth quarter. Buyers contracted sparingly as a rule. New business is now 1.85c, Buffalo.

Washington.—Bids close Oct. 6 on 217 tons of galvanized medium flat bar steel for the navy, delivery at Boston, Philadelphia, Norfolk, Mare Island and Puget Sound.

Carnegie Steel Co., Pittsburgh, has been awarded most of 885 tons of steel bars for 10 destroyers to be built at navy yards, Boston, Philadelphia, Norfolk, Puget Sound and Mare Island; bids Sept. 15. Award has been made of 665 tons, all but 35 tons, which went to Jones & Laughlin Steel Corp., Pittsburgh, being booked by Carnegie Steel Co.

Plates

Heavy Buying Before Price Rise Cuts Current Volume—Many Barge Inquiries Active

PLATE PRICES, PAGE 56

Pittsburgh—Plates are now 1.70c Pittsburgh, on all business not entered under contract during third quarter. Most buyers availed themselves of the opportunity to contract at 1.60c before Oct. 2. Sudden revival in the Ohio river barge market finds 12,000 to 15,000 tons of plates immediately pending. Over 40 and possibly 53 barges in at least eight different privately-sponsored prospective purchases are out. Leading is an inquiry for 2400 tons in twenty 120-ton wood-lined steel coal barges for Illinois river. An Ohio river coal transporter is expected to close on ten barges this week, requiring almost 1600 tons of plates. A similar buyer may order either 10 or 20 barges, although whether these will be wood or steel is not yet settled. Individual inquiries for five barges each in single units may account for more than 1000 tons. Greenville, Miss., takes bids Oct. 16 on an 800-ton floating wharf. Texas Corp., New York, is believed to have purchased six steel barges through its Shreveport, La., division from a Louisiana shipbuilding concern, requiring over 800 tons of plates. Cincinnati federal engineers close Oct. 6 on two steel needle flats, taking 40 tons.

Cleveland—Third quarter contracts at 1.60c, base, Pittsburgh, or less, were specified practically in full by the close of September, as required under code regulations. New contracting for fourth quarter at the single price of 1.60c, also was heavy before the $2 a ton increase effective Sept. 30. Fabricators were eager to cover and in some instances made some speculative purchases. The form of contract most generally used was that known as No. 3, and described under Cleveland bars. Award of 5000 tons for Cleveland watermains is expected shortly, the city ordering general contractors to proceed.

With the freight surcharge canceled Oct. 1, the delivered price of plates in Cleveland for fourth quarter is 1.88½c.

Chicago—Plate orders are coming principally from miscellaneous sources, with oil and railroad industries providing only small lots. Brewery tanks continue to take moderate tonnages, while heavier inquiries for distillery plant construction are expected to appear soon. Plates now are 1.75c, Chicago, with fairly heavy contracting done before the recent advance of $2 a ton.

Boston—Most regular consumers of plates covered for fourth quarter at 1.70c, Coatesville, Pa., last week before the advance of $2 to 1.80c, Coatesville. This contracting, however, was for moderate monthly require-

ments. A fair tank tonnage for the Harvard brewery, Lowell, Mass., has been placed.

Philadelphia. — Substantial fourth quarter buying characterized recent plate business, consumers covering before the $2 advance went into effect Sept. 30. Considerable confusion attended the placing of many of these contracts, however, in view of misunderstandings concerning recently announced rules for contracting. While possibly the greatest actual number of contracts placed were under forms having to do with specific tonnages, most tonnage was arranged for under the so-called "percentage" form of contract.

Contracts Placed

3245 tons, 8,000,000 cubic foot gas holder, Omaha, Nebr., to Stacey Mfg. Co., Cincinnati.
2400 tons, galvanized, navy, Washington, for 10 destroyers, to Carnegie Steel Co., Pittsburgh.
2000 tons, galvanized, navy, Washington, American Sheet & Tin Plate Co., Pittsburgh.
200 tons, estimated, mostly plates, dump barge, Panama; plates, liners and straps, to United States Steel Products Co., New York, $18,380.40; shapes to Bethlehem Steel Export Corp., $8228.13; rivets, Pittsburgh Screw & Bolt Co., $1438.18; bids Sept. 15.
100 tons, standpipe, Etna, Pa., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

Contracts Pending

2400 tons, twenty 120-ton wood-lined coal barges for unstated buyer in Chicago district, for Illinois river trade.
1600 or 3200 tons, either ten or 20 steel coal barges, for Ohio river use. Unstated buyer.
1580 tons, ten steel coal barges for Ohio river use. Unstated buyer.
800 tons, floating wharf for Greenville, Miss.; bids Oct. 16. Theodore Brent, New Orleans, engineer.
600 tons, two 200 x 40-foot Mississippi river barges for unstated New York buyer.

Sheets

Shipments Continue Heavy, New Buying Light—Freight Surcharge Off—New Extras

SHEET PRICES, PAGE 56

Pittsburgh—Third quarter contracts generally were completed a week before the quarter ended so that last week showed little of the feverish activity in specifying which characterized other finished steel markets. There has been little contracting for fourth quarter. Automobile sheets are untested. Only in hot rolled sheets has there been any recent change in the price schedule. These now are quoted 1.75c, Pittsburgh, for No. 10 gage. Black, galvanized and full finished prices hold. Sheets for the production of steel drums have been in better demand, several orders being noted.

Cleveland—Shipments on third quarter contracts will be heavy up to Oct. 15, when producers who have any unfilled tonnage must give reason to the steel code committee before such orders can be filled. The result has been near-capacity sheet mill operations here and in an adjacent lake district. Further, producers required that all tonnage previously rolled and held on mill floors to the account of buyers on third quarter contracts had to be moved out by Oct. 1. These shipments in many instances have strained buyers' credit, and little new buying at the advanced prices is expected for two or three weeks. Attention has been centered on completing old contracts, with new buying light, and automotive interests out of the market for the present, except for small fill-in lots.

Chicago—Sheet production is steady at a fairly high rate as mills complete shipment against old contracts. New business is rather quiet. Shipments to the automotive industry are heavy, reflecting well sustained operations in addition to desires of consumers to take material against old contracts. Radio equipment manufacturers are enjoying fairly heavy schedules, although electrical refrigerator interests are in a quieter period.

Boston—Forward business on sheets is lacking in volume, although some spot buying is being done by small tank and container interests. Prices are steady with 1.75c, Pittsburgh, paid for No. 10 hot rolled, 2.25c for black, and 2.85c galvanized.

New York.—Featuring a generally quiet sheet market is the announcement of new quantity extras on less than car lot shipments as noted

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in the Philadelphia market letter. Due to a ruling under the steel code, it is said, mills are not permitted to sell seconds except at a price equivalent to the next lowest grade. This has so reduced the profit available to resellers of this material as to practically check its flow. An early adjustment of this situation is ex-

Philadelphia—New quantity extras have been established on less than carlot shipments, affecting all the standard grades of sheets, including long ternes, galvanized roofing, and painted roofing. To obtain these extras all commodity items on an order are totaled, with a 15-cent extra per 100 pounds applying on 7500 pounds or over, and a 25-cent extra on less than 7500 pounds. There also is an odd-size extra, applying to either carlot or less than carlot shipments, of 10 cents per 100 pounds on each item, totaling less than 1500 pounds; provided shipment over or under each item is permissible. Forty-eight-inch width has been added as standard size for hot rolled and galvanized sheets. Buying continues slack, with most consumers fairly well stocked. Effective Oct. 1, the freight surcharge on carlot and less than carlot shipments was discontinued. On carlot shipments the present rate from Pittsburgh now is 29 cents, instead of 31 cents previously.

St. Louis—Sheet orders for third quarter have been virtually cleared up by the heavy specifications of the past several weeks. Producers and distributors report a fair volume of business for fourth quarter, but contracting on a large scale has not developed. S. G. Adams Co., St. Louis, is low on 1934 automobile license plates for Arkansas.

Cold-Finished Price Firm

Cold Finished Prices, Page 57

Pittsburgh—Fourth quarter books on cold-finished steel bars were opened last week at 1.95c, Pittsburgh, and 2.00c, Cleveland, Chicago, and Buffalo. Detroit was named 2.15c and eastern Michigan 2.20c. Turned and ground shafting prices were reaffirmed. The decision to continue prices unchanged came as a surprise, although with the advance in hot-rolled bars now in effect on all business not under contract, it is logical to expect that a higher price on cold-drawn bars will be filed by producers. Anticipation of this price advance some time this month has been driving in cold-finished bar specifications the past week.

PROGRESS? YES!

When we told you why Mansfield Electrical Sheets are INHERENTLY GOOD, and they are, we did not mean that we feel satisfied with them. When they are perfect, we won't need to do much but rest, but now we are hustling constantly to make PROGRESS.

PROGRESS means to us doing a better job, giving you better sheets, better looking and better behaving, so that your job may be easier and that your motors and transformers may be better.

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C. F. Kettering

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Sales Offices:

New York, Dayton, Cleveland, Indianapolis, Chicago, Detroit, St. Louis, San Francisco

Structural Shapes

Awards Up, with 12,931 Tons for Grand Island Bridge, and 7809 Tons for Calumet Breakwater—More Action Is Noted on Many Federal Projects

STRUCTURAL SHAPE PRICES, PAGE 56

New York—Buyers were cautious in covering through the fourth quarter at 1.70c, eastern mill, ahead of the $2 advance in plain structural material. Structural demand is heavier with bids in on 15,000 tons for the Manhattan midtown postoffice superstructure. Federal government building has speeded up with bids asked on many projects in the East. For the Grand Island bridges superstructures, Erie and Niagara counties, New York, 12,373 tons have been awarded. Plain material now is 1.80c, eastern mill.

Pittsburgh—Before the close of the third quarter, structural shape fabricators were required to name their anticipated requirements for fourth quarter. On specific jobs closing prior to Dec. 1, protections are being granted. However, on all spot business henceforth, 1.70c base, Pittsburgh, is the price of plain material. Fabrication has been completed on the New Orleans bridge by interests here, and beginning early in October the first steel for the San Francisco-Oakland bridge towers will be fabricated here.

Chicago—Sheet piling to the amount of 7809 tons for the Calumet, Mich., breakwater, has been awarded to Inland Steel Co., subject to final approval by government engineers. Bids will be opened this week for a breakwater at Indiana Harbor, Ind., also taking a round tonnage. With these two projects, and Mississippi river dam work on which bids were opened last week, approximately 25,000 tons of steel will be placed. An award of 700 tons is noted for a railroad train shed. New inquiry consists principally of state highway bridges. Trash racks for Boulder dam will take 3100 tons.

Cleveland—Award of 600 tons for the Cleveland incinerator building, and pending award of 400 tons additional for the incinerator feature the local market. A substantial tonnage also is pending for the Cleveland easterly sewage disposal plant. Ohio is taging bids on various bridge projects Oct. 6, requiring approximately 600 tons. Fabricators with known requirements covered ahead at 1.60, base, Pittsburgh, before the advance of $2 a ton became effective Sept. 30. Since the freight surcharge has been canceled, the delivered price of plain material in Cleveland now is 1.88½.

Boston—Bids are in on Maine and New Hampshire bridges, taking approximately 650 tons. Awards are light. Plain material is up $2 a ton to 1.80c, eastern mill. While consumers of plain material covered generally through the fourth quarter at 1.70c, eastern mill, in most cases they anticipated minimum requirements.

Philadelphia—While shape producers generally advanced prices $2 a ton, Sept. 30, to 1.80c, Bethlehem, they are permitted, it is said, to extend their third quarter prices until Oct. 5, on specific building jobs. A reasonable time will then be allowed for the successful contractor to sublet his work. It is understood that 60 days may be allowed.

Contracts Placed

12,373 tons, superstructure, Grand Island bridges, Erie and Niagara counties, New York, to Taylor-Fichter Steel Construction Co., New York; Jones & Laughlin Steel Corp., Pittsburgh, to supply steel.

7809 tons, piling for breakwater, Calumet, Mich., to Inland Steel Co., Chicago; subject to final approval by United States engineers.

1100 tons, piling, Cumberland river dam, Nashville, Tenn., to Inland Steel Co., Chicago.

825 tons, highway bridges, Oklahoma; 400 tons to J. B. Klein Iron Foundry Co., Oklahoma City; 275 tons to Kansas City Structural Steel Co., Kansas City, Mo.; 150 tons to Capitol Steel & Iron Co., Oklahoma City.

700 tons, LaSalle street station train shed, Chicago, to American Bridge Co., Pittsburgh.

600 tons, framing for incinerator building, Cleveland, to Fort Pitt Bridge Works Co., Pittsburgh; through Sam W. Emerson Co., general contractor, Cleveland. Approximately 400 tons additional for incinerator to be awarded shortly.

450 tons, bridge, French Broad river, highway 32, White Pine and Newport, Tenn., Jefferson-Cocke counties, Tennessee, to Vincennes Bridge Co., Vincennes, Ind.

310 tons, state highway bridge, Chautauqua county, New York, to R. S. McManus Steel Co., Buffalo; W. S. Johnson, general contractor.

300 tons, building, National Refining Co., Edgewater, N. J., to American Bridge Co., Pittsburgh.

297 tons, bridge, carrying route 6, section 1-E over tracks, New Jersey & New York railroad, Hasbrouck Heights, N. J., to American Bridge Co., Pittsburgh; George M. Brewster & Sons Inc., Bogota, N. J., general contractor.

250 tons, state bridge, Gowanda village, Cattaraugus county, New York, to Lackawanna Steel Construction Corp., Buffalo; John Tata, Buffalo, general contractor.

230 tons, bridge, Capon river, Hampshire county, West Virginia, to Wheeling Structural Steel Co.; E. R. Mills, Charleston, W. Va., general contractor.

220 tons, New York state bridge, Sullivan county, New York, to Jones & Laughlin Steel Corp., Pittsburgh.

200 tons, trestle for Golden Gate bridge, San Francisco, to Moore Drydock Co., Oakland, Calif.

160 tons, highway bridge, York county, Pennsylvania, to McClintic-Marshall Corp., Bethlehem, Pa.

160 tons, warehouse, Heywood-Wakefield Co., Gardner, Mass., to Berlin Construction Co., Berlin, Conn.; Wiley & Foss, Fitchburg, Mass., general contractor.

150 tons, bridge, Albia, Iowa, to Illinois Steel Bridge Co., Jacksonville, Ill.

145 tons, state bridge over Feliz Creek, Mendocino county, California, to Judson-Pacific Co., San Francisco.

140 tons, nine beam spans, Flagler and Seibert, Colo., to American Bridge Co., Pittsburgh.

140 tons, bridge, Lewis county, New York, to R. S. McManus Steel Construction Co. Inc., Buffalo.

125 tons, industrial building, Warren Glen, N. J., to Tippet & Wood, Phillipsburg, N. J.

120 tons, two projects, to McClintic-Marshall Corp., Bethlehem, Pa.; one for 80 tons for county bridge No. 262, Montgomery county, Pennsylvania; the other for 40 tons for a storage building for E. I. du Pont de Nemours Inc., at Gibbstown, N. J.

120 tons, plain material for easterly sewage disposal plant, Cleveland, to Carnegie Steel Co., Pittsburgh. Additional tonnage to be placed later.

105 tons, pipe supports, Niagara Falls, N. Y., project to Austin Co., Cleveland.

Unstated tonnage, Island of Orleans bridge, Quebec province, Canada; Dominion Bridge Co. Ltd., Montreal; awarded $813,747 contract for superstructure.

Shape Awards Compared

	Tons
Week ended Sept. 30	26,981
Week ended Sept. 23	11,930
Week ended Sept. 16	11,893
This week in 1932	9,499
Weekly average, 1932	14,285
Weekly average, 1933	14,240
Weekly average, Aug.	6,982
Total to date, 1932	602,160
Total to date, 1933	569,583

Contracts Pending

3100 tons, trash racks, Boulder dam, Boulder, Nev.

3000 tons, citizens conservation corps

camps, various locations. Inquiry recalled with plan to use steel rejected in favor of wood.

2075 tons, two parallel locks, Gallipolis Lock and dam, Ohio river, near Hogsett, W. Va.; bids Oct. 17 to United States engineer, Huntington, W. Va. Other requirements include 200 tons of steel piling, 76 tons of nickel steel, 58 tons of steel forgings and 10 tons of bolts.

1100 tons, inquiries from Chicago district shipbuilders.

1075 tons, hurricane gates, Lake Okeechobee, Florida; bids to federal engineer's office.

1000 tons, highway bridges, Missouri.

1000 tons, building, Youngstown Sheet & Tube Co., Indiana Harbor, Ind.

900 tons, building, Knoxville, Tenn.

850 tons, highway bridges, Iowa.

680 tons, Russian river state bridge, Mendocino county, California; general contract to J. H. Pomeroy & Co.

675 tons, New York state bridges; openings at Albany, Oct. 3 and 10.

600 tons, addition to Fleischman Malting Co. plant, Minneapolis.

572 tons, bridge, Woodward county, Oklahoma; bids Oct. 3.

500 tons, New York state bridges; bids Oct. 17.

450 tons, state bridges Texas; bulk for spans in Gonzales and Gregg counties; bids in Sept. 28.

350 tons, postoffice, Cambridge, Mass.; supplemental bids from original bidders Oct. 9.

350 tons, overhead crossing, New London, Wis.; Wisconsin Bridge & Iron Co., Milwaukee, low.

325 tons, bridge Price county, Wisconsin; C. R. Meyer & Sons Co., Oshkosh, Wis., low for general contract.

320 tons, building, Swift & Co., New York.

300 tons, highway bridges, New Hampshire; bids in Sept. 28.

275 tons, Russian river state bridge, Sonoma county, California; general contract to B. McGowan.

260 tons, bridge, Biddeford-Saco, Me.; Cyr Bros., Waterville, Me., low.

250 tons, bridge, Independence, Wis.; bids Oct. 5.

200 tons, municipal foot bridge, Cleveland.

182 tons, buildings and bulkhead, Harvey Lock, Harvey, La.; bids Oct. 12 to United States engineer, first district, New Orleans. Work also takes 27 tons of reinforcing steel, 17 tons tie rods, and several hundred tons of steel piling.

175 tons, postoffice, Lewiston, Me.; bids again Oct. 23.

161 tons, crossing at Oil Junction, Kern county, California; bids Oct. 11.

150 tons, Bonne Carre Spillway bridge, Baton-Rouge-New Orleans highway, St. Charles parish, Louisiana; Guthrie Construction Co. and Koss Construction Co., Des Moines, Iowa, low for general contract. Bids rejected.

123 tons, state bridge over North Fork Feather river, Plumas county, California; general contract to Lynch-Cannon Engineering Co.

107 tons, bridge, Comanche county, Oklahoma; bids Oct. 3.

100 tons, state bridge, Middle river, route 11, Augusta county, Virginia; bids Oct. 5.

100 tons or more, postoffice, Waltham, Mass.; supplemental bids from original bidders, Oct. 10.

Unstated tonnage, marine hospital, Portland, Me.; supplemental bids Oct. 6 from original bidders.

Concrete Bars

Public Works Programs Are Accelerated in Some Districts with Larger Tonnages in Early Prospect—Eastern States Inquiring for Substantial Mesh Requirements

REINFORCING BAR PRICES, PAGE 57

Pittsburgh—Concrete bar orders held up to a fair total in September. An unstated tonnage of reinforcing steel will be bid to Allegheny county, Pennsylvania, Oct. 3. Several state lettings are current, requiring a substantial tonnage of bars. A bid of 1.90c base, Pittsburgh, for 375 tons of new billet steel bars in cut lengths was successful on a recent navy opening.

Cleveland—A larger tonnage of reinforcing bars is pending, on which action is expected shortly. General contracts have been awarded, and bars to the amount of 250 tons for the Cleveland incinerator, and 400 tons for the easterly sewage disposal plant probably will be purchased this week. Ohio is taking bids on road projects, Oct. 6, requiring 250 tons.

Chicago—Concrete bar orders continue light with delay still encountered in proposed highway work in some states, including Illinois. Several hundred tons are pending for Indiana highway construction.

Boston—Demand for reinforcing steel is slightly heavier as public works are nearing the bidding stage. The federal building program which includes a growing number of New England projects is being speeded up. For standard highway mesh, $58 a ton, Pittsburgh, for lots over 20 tons is on file.

New York—Highway mesh buying for New York and New Jersey continues heavy with a substantial volume yet to be placed. On mesh for these states $52 a ton, Pittsburgh, has been filed by one producer for lots over 20 tons, or $6 a ton under so-called standard material. Sales of stocked bars at prices under replacement have practically ended. Billet bars, cut lengths, are 1.95c, Pittsburgh.

Philadelphia—The local market continues dull, although general contracts are being awarded by New Jersey on road work requiring close to 1000 tons. Billet steel bars in cut lengths are unchanged at 1.90c, Pittsburgh, or 2.19c, Philadelphia.

Concrete Awards Compared

	Tons
Week ended Sept. 30	**2,887**
Week ended Sept. 23	**2,112**
Week ended Sept. 16	**2,720**
This week, 1932	**8,317**
Weekly average, 1932	**3,920**
Weekly average, 1933	**3,425**
Weekly average, Aug.	**3,074**
Total to date, 1932	**163,955**
Total to date, 1933	**137,005**

Contracts Placed

405 tons, two navy openings, to Jones & Laughlin Steel Corp., Pittsburgh. Opening of Sept. 21, 375 tons for delivery to Panama, and recent opening for Norfolk, Va., navy yards, 30 tons.

350 tons, highway, Fulton county, New York, to Kalman Steel Corp., Bethlehem, Pa.; through D'Onfro Bros. Inc.

279 tons, state highway work in ten counties in California, to unnamed interests.

250 tons, mausoleum, Altadena, Calif., to Soule Steel Co., Los Angeles.

225 tons, highway, Madison county, New York, to American Steel & Wire Co., New York; through Dale Engineering Co.

200 tons, highway, Rhode Island, divided between Truscon Steel Co., Youngstown, O., and American Steel & Wire Co., New York.

200 tons, highway, Westchester county, New York, to Kalman Steel Corp., Bethlehem, Pa.; through Thomas A. Brogan.

200 tons, Sawmill river parkway, Westchester county, New York, to Kalman Steel Corp.; through Johnson, Brake & Piper Inc.

175 tons, highway, route 29, section 12A, Centerville to River road, Somerset county, New Jersey, to Truscon Steel Co., Youngstown, O.; S. J. Groves & Co., general contractor.

168 tons, grade separations, Nassau county, New York, to Joseph T. Ryerson & Son Inc., New York.

120 tons, Irish-American Home, San Francisco, to W. S. Wetenhall Co., San Francisco.

115 tons, state highway work near Grand Canyon bridge, Arizona, to unnamed interest.

100 tons, addition to library, San Marino, Calif., to Blue Diamond Co., Los Angeles.

100 tons, state bridge in Skagit county, Washington, and material for Puget Sound, Wash., navy yard, to Pacific Coast Steel Corp., Seattle.

Contracts Pending

2000 tons, Bonne Carre Spillway bridge, Baton Rouge-New Orleans highway, St. Charles parish, Louisiana; Guthrie Construction Co. and Koss Construction Co., Des Moines, Iowa, low

for general contract. Bids rejected.

1300 tons, bridges and approaches, Erie railroad, Elmira, N. Y.

1200 tons, highways and bridges, Texas; bids in Sept. 28. Bulk for Bell-Falls, Gonzales and Gregg counties projects.

450 tons, dam on Ohio river at Gallipolis, O.; bids Oct. 16.

330 tons, deformed billet bars, mainly squares, Panama; bids Oct. 5. Bids in on 375 tons for same point. Material is for Madden dam.

325 tons, mainly mesh, Marengo-Hale counties, Alabama; bids in Sept. 29.

200 tons, highways, Rhode Island; bids in.

192 tons, state highway work in Los Angeles county, California; Oswald Bros., general contractor.

178 tons, state highway work in five counties, Montana; bids in Sept. 28.

150 tons, Feather River bridge, Plumas county, California; F. C. Amorose & Son, low.

145 tons, conduit on Muscatel avenue, Los Angeles; Bannister-Field Co., low,

125 tons, superstructure, midtown postoffice, Manhattan (New York); also substantial quantities of floor mesh and other reinforcing material. Bids in Oct. 2.

119 tons, crossing at Oil Junction, Kern county, California; bids Oct. 11.

107 tons, dam, Winfield, W. Va., on the Big Kanawha river; bids Oct. 2.

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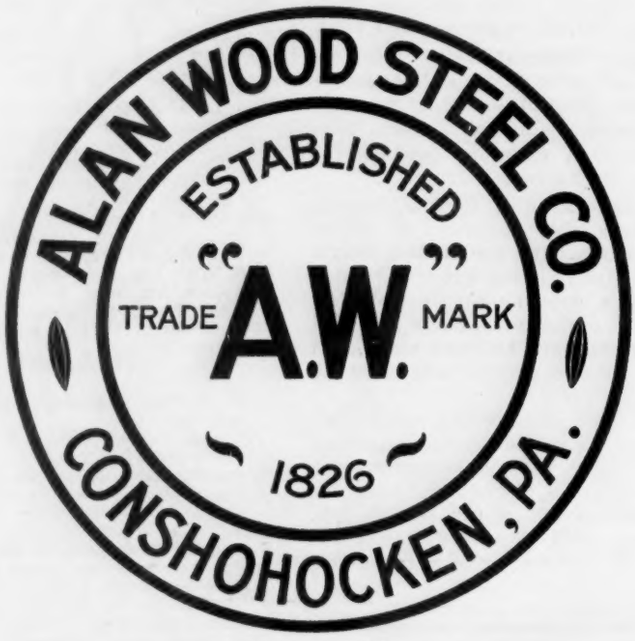

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Semifinished Demand Slow; Strike Stops Some Shipments

Semifinished Prices, Page 58

Contracting for sheet bars, billets and slabs for fourth quarter at the unchanged price of $26, base, Pittsburgh, Youngstown and Cleveland, is slow, and volume light. Wire rods are fairly active at $35, Pittsburgh. Forging billets continue at $31. A strike in a Pittsburgh district tin mill has shut off sheet bar shipments to that point.

Ferromanganese Price Extended for Fourth Quarter

Ferroalloy Prices, Page 58

Sellers of ferromanganese have reaffirmed the $82, seaboard, price for fourth quarter. This price will continue to apply to both spot and contract tonnage. Specifications are rather light. Domestic spiegeleisen, 19 to 21 per cent, is steady at $27, furnace, for spot shipments.

Tin Plate Operations Off; Strike at Pittsburgh Mill

Tin Plate Prices, Page 56

Pittsburgh—Capacity tin plate schedules were interrupted last week, and for the district the rate declined to approximately 85 per cent, owing to suspension in one mill due to a strike. All producers are believed to have enough tin plate backlogs to assure operations through November. Canmakers are likely to continue to take as much as possible under their low-price contracts, but there probably will be no speculative buying on their part. The spot price of tin plate is $4.65.

Bolt, Nut Buying Lags

Bolt, Nut, Rivet Prices, Page 57

Prices continued from third quarter cover October only, and nothing has been done for the remainder of fourth quarter. These prices are: Carriage and machine bolts, 73 off; large rivets, 2.50c, base Pittsburgh and Cleveland, and 2.60c, Chicago; small rivets 70, 10 and 5 off, wrought washers, 6.00c off.

Pipe

Cleveland Awards 12,000 Tons, 6000 More to Come—New Discounts on Small Seamless Lots

PIPE PRICES, PAGE 57

Pittsburgh—The market was no more active in September and sizable orders still were lacking. Revised list of discounts is now in effect on small lots of cold-drawn seamless tubing, although the carload discount of 70 per cent is unchanged. The steel pipe discounts as of the July 1 card continue to apply, except for the inclusion of Gary, Ind., as a base along with Pittsburgh and Lorain, O. Demand is slightly better in butt-weld sizes but lap-weld and seamless show no activity.

Cleveland.—For Cleveland watermains, 12,000 tons of cast pipe have been divided between two foundry interests. The remaining cast pipe for the job, approximately 6000 tons, is to be awarded this week. Award of 5000 tons of plates for steel pipe portions also is pending for early action. The city last week signed five general contracts covering the work, and ordered immediate construction. Pipe requirements otherwise are limited to carload lots, with several municipal jobs in Ohio awaiting federal aid.

Chicago—Cast pipe orders and inquiries still are few despite the large number of proposed waterworks and sewage disposal projects in this and nearby states. Springfield, Ill., will require some additional tonnage for water-line extensions, while Evanston, Ill., has plans for water mains in addition to a reservoir and storage tank.

Cast Pipe Placed

12,000 tons, Cleveland water mains; 5400 tons to James B. Clow & Sons, Chicago; 6600 tons to United States Pipe & Foundry Co., Burlington, N. J. Approximately 6000 tons additional cast pipe, and 5000 tons of steel pipe to be awarded shortly.

500 tons, 8, 12 and 20-inch, Arlington county, Clarendon, Va., to DeLashmutt Bros. Inc., Arlington, Va.

175 tons, city of New York, to Donaldson Iron Works, Emaus, Pa., opening of Sept. 20. Remainder to United States Pipe & Foundry Co., Burlington, N. J.

160 tons, 12 and 16-inch, Long Island railroad work, Jamaica, N. Y., to Donaldson Iron Works, Emaus, Pa.

125 tons, small sizes, state project, Wassaic, N. Y., to Donaldson Iron Works, Emaus, Pa. This in addition to tonnage recently placed.

Steel Pipe Placed

4000 tons, 18-inch electric welded pipe for 65-mile gas line extension, Minnesota Northern Natural Gas Co., to Youngstown Sheet & Tube Co., Youngstown, O.

Cast Pipe Pending

600 tons, 16, 18 and 24-inch, state highway project, Interborough Parkway, Long Island, N. Y.

205 tons, classes A and B, about evenly divided, bridge project for Erie railroad, Elmira, N. Y.

180 tons, Niagara, N. Y.

200 tons, 4, 6 and 12-inch, state project, Dannemora, N. Y.

100 tons, small sizes, state project, Rome, N. Y.

100 tons, 6, 8 and 12-inch, for Bremerton, Wash.; bids in.

Steel Pipe Pending

201 tons, steel, wrought and cast iron pipe, two locks, Ohio river, near Hogsett, W. Va.; bids Oct. 17, United States engineer, Huntington, W. Va.

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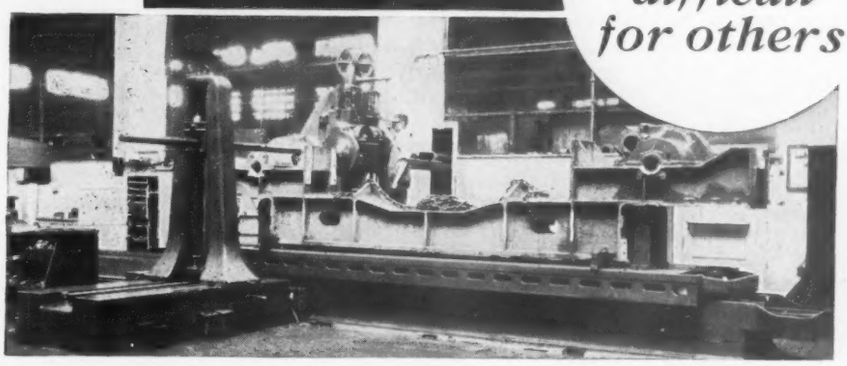

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Pig Iron

Award of 50,000 Tons of Tunnel Segments Features Market —Volume of New Orders Light

PIG IRON PRICES, PAGE 58

Pittsburgh—Shipments the last week in September tapered off and few replacements in the form of new buying were in the market. Furnaces continue to book little more than a carload or two at a time and many melters claim complete disinterest in forward needs. This attitude is partly due to the price setup under the code whereby unchanged levels are continuing. The local base is $18 on foundry grades, $18.50 on bessemer and a nominal $17.50 on basic, the latter having been untested.

Cleveland—The market is quieter, sales here for the week dropping to approximately 2000 tons. Inquiries are scarce and limited to small lots. September shipments exceeded August by a slight margin. Tonnage under contract for third quarter and unfilled by furnaces by Oct. 1 will be shipped in October. The 10-cent per net ton freight surcharge expires Oct. 1. The market continues $17.50, base, lake furnace. Producers, viewing coal costs, anticipate another advance in pig iron during the fourth quarter.

Chicago—Shipments last month practically equaled those of August and in view of business remaining on books, movement over the balance of this year is expected to equal or better the recent rate. New business consists almost entirely of small lots and since consumers are able to buy only for fourth quarter delivery and already have made heavy commitments for that period, orders are expected to be light until December when first quarter books may be opened. Foundry operations are moderately lower and some iron now being taken is destined for future consumption rather than for immediate use. The market continues $17.50, furnace, for No. 2 foundry and malleable.

Boston—Aggregate sales have been slightly heavier, made up largely of small lots. Most larger consumers are covered well into this quarter and in several instances with foreign iron bought weeks ago. Prices are steady and uniform at $18, Everett, plus freight, for foundry iron. Indian imports are steady, with fair-sized shipments scheduled to arrive. This brand is being sold on the domestic price base.

New York—Bethlehem Steel Co., has been awarded 50,000 tons of cast iron tunnel segments by the Port of New York authority. Fourth quarter contract is largely completed.

Bids close Oct. 17 on 269 tons of foundry iron for the Norfolk, Va., navy yard.

Philadelphia—Award of approximately 50,000 tons of cast iron tunnel segments by the Port of New York Authority to the Bethlehem Steel Co. takes out of the general market the requirements of possibly 25,000 tons of pig iron. Meanwhile, fresh buying is light, with prices strong, reflecting in part increasing material and labor costs. The up-

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ward tendency in coke is particularly pronounced, as a result of continued curtailed production due to labor difficulties in the coal regions. Freight surcharges went off Oct. 1, with the delivered price on No. 2 plain foundry $18,26, Philadelphia; malleable $18.76; and basic $17.76.

Brooke furnace, Birdsboro, Pa., has been relighted.

Buffalo—Demand is confined to immediate needs only, with no major inquiry pending. Local melt is good, especially in radiator works, but shipments are running slightly behind the best levels of the third quarter. Six furnaces continue active in this district.

Cincinnati—Shipments during September were heavy, but new buying, except in carload or 100-ton lots, has been slack. Needs into the early part of the fourth quarter, at least, are covered in most instances and no price advance is imminent. Foundry melt has tapered, with just enough demand from machine tool builders to bolster hopes for an upturn soon in this line.

St. Louis—New buying is quiet, but shipments continue good and prices hold firm. The melt has gained, with practically all stove and heating apparatus plants active. Inquiry for basic iron has appeared after an absence of several months. Labor difficulties in the Belleville and East St. Louis areas have largely subsided.

Birmingham, Ala.—Small-lot business still predominates but shipments through the last week of the month were heavy. No change in production has taken place, six blast furnaces being on foundry iron and two on basic. Price base is unchanged.

Toronto, Ont.—Sales for the week showed some improvement, with total awards approximately 600 tons. Melters, however, are confining orders to single car lots and no inquiry is out for future delivery. Production is holding at its high level for the year with four stacks blowing. Prices are unchanged.

Coke

Prices To Rise on Coal Cost; Demand Is at Steady Rate

Coke Prices, Page 58

Beehive coke is at purely nominal levels with producers out of the market. Furnace and beehive foundry coke probably will be advanced this week by as much as $1 to $1.50 per ton. Advance is predicated upon the resumption of soft coal mining operations, in turn dependent upon signing of the coal code. Increased costs dictate filing of an indicated base price of $1.90, western Pennsylvania, on by-product mine run coal. This as base, plus costs and conversion, will call for at least $3.75 on furnace coke and $4.50 on common beehive grades of beehive foundry. Nominal markets are $2.50 and $3.25, respectively, on these grades. Beehive premium probably will be increased to over $5.

Shipments of by-product foundry coke at Chicago have been fairly heavy and compare favorably with the August rate. No change is anticipated for October, the September quotations of $8, ovens, for outside delivery and $8.75, delivered Chicago, being scheduled for extension.

In other centers conditions are quiet, prices being nominal until the coal situation clears.

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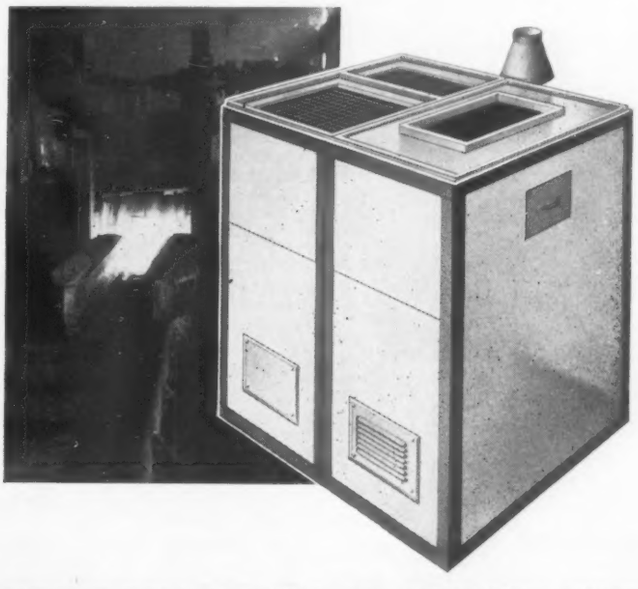

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Scrap

Buying Lull Is Continued—Prices Show Little Yielding—Distress Tonnage Small

Pittsburgh — The scrap market reached a virtual standstill last week. A strike at one important plant shut off all scrap shipments. Prices are nominal and heavy melting steel at $12.50 to $13 does not reflect a true gage. A 25,000-ton Pennsylvania railroad list to close Oct. 4 may decide the market this week. One feature indirectly lending strength is in recent Japanese, Polish and Italian export orders for No. 1 and No. 2 steel placed in the East. Compressed and hand bundles are weaker but other prices have been unchanged.

Chicago—Mills still show little interest in scrap purchases. One interest has bought a small lot of heavy melting steel at $9.75, compared with previous purchases at $10, but

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	9.50 to 10.50
Boston, dealers	6.25 to 6.75
Buffalo, No. 1	10.50 to 11.00
Buffalo, No. 2	9.00 to 10.00
Chicago	9.50 to 10.00
Cleve., No. 1	10.50 to 11.00
Cleve., No. 2	10.00 to 10.50
Det., No. 1	8.00 to 8.50
Det., No. 2	7.00 to 7.50
E. Pa.	10.50
E. Pa., No. 2	9.50
Federal, Ill.	8.75 to 9.25
Granite City, Ill.	8.25 to 8.75
N. Y., deal. R. R.	8.00
N. Y., deal. No. 2	7.00
Pitts., No. 1	12.50 to 13.00
St. L. No. 1 del.	9.75 to 10.25
Valleys, No. 1	13.00 to 13.50

COMPRESSED SHEETS

Buffalo, dealers	9.00 to 10.00
Chi. (Factory)	7.75 to 8.75
Cleveland	10.00 to 10.50
Detroit	8.00 to 8.50
E. Pa. new mat.	10.00 to 10.50
Pittsburgh	12.00 to 12.50
Valleys	12.50 to 13.00

BUNDLED SHEETS

Buffalo	5.50 to 6.00
Cincinnati, del.	6.00 to 6.50
Cleveland	8.00 to 8.50
Eastern Pa.	9.00 to 9.50
Pittsburgh	11.00 to 11.50
St. Louis	6.00 to 6.50

SHEET CLIPPINGS LOOSE

Chicago	4.50 to 5.00
Cincinnati	4.50 to 5.00
Detroit	5.00 to 6.00
St. Louis	5.50 to 6.00

STEEL RAILS SHORT

Birmingham	11.50 to 12.00
Boston, dealers	7.00 to 7.25
Buffalo	12.00 to 12.50
Chicago (3 ft.)	11.00 to 11.50
Chicago (2 ft.)	12.00 to 12.50
Cincinnati, del.	11.50 to 12.00
Detroit	10.00 to 10.50
Pitts. (open-hearth, 3 ft. and less)	14.50 to 15.00
St. Louis	11.50 to 12.00

STOVE PLATE

Birmingham	7.00 to 8.00
Boston, dealers	4.50 to 4.75
Buffalo	9.00 to 9.50
Chicago, net	7.00 to 7.50
Cinci., deal.	7.00 to 7.50
Detroit, net	4.50 to 5.00
Eastern Pa.	8.50 to 9.00
N. Y. deal. Fdry.	6.00
St. Louis	7.00 to 7.50

COUPLERS, SPRINGS

Buffalo	11.50 to 12.00
Chicago	10.50 to 11.00
Eastern Pa.	13.50 to 14.00
Pittsburgh	14.50 to 15.00
St. Louis	10.00 to 10.50

ANGLE BARS—STEEL

Chicago	10.50 to 11.00
St. Louis	10.00 to 10.50

LOW PHOSPHORUS

Buffalo, billets and bloom crops	11.50 to 12.50
Cleveland bil. and bloom crops	12.50 to 13.50
Eastern Pa. crops	14.00 to 14.50
Pittsburgh billet bloom crops	14.50 to 15.00
Pitts., sheet bar crops	14.50 to 15.00

FROGS, SWITCHES

Chicago	9.50 to 10.00
St. Louis	10.00 to 10.50

SHOVELING STEEL

Chicago	9.50 to 10.00
Cleveland	10.50 to 11.00
St. Louis	9.00 to 9.50

RAILROAD WROUGHT

Birmingham	8.00 to 8.25
Boston, dealers	2.00 to 2.50
Buffalo, No. 1	7.00 to 8.00
Buffalo, No. 2	10.50 to 11.00
Chi., No. 1, net	8.00 to 8.50
Chi., No. 2	9.50 to 10.00
Cinci., No. 2	9.00 to 9.50
Eastern Pa.	11.00 to 11.50
N. Y., No. 1 deal.	7.00 to 7.50
Pitts., No. 1	12.50 to 13.00
St. Louis, No. 1	7.00 to 7.50
St. Louis, No. 2	8.75 to 9.25

SPECIFICATION PIPE

Boston	4.00 to 4.50
Eastern Pa.	9.50 to 10.00
N. Y., deal.	4.75 to 5.25

BUSHELING

Buffalo, No. 1	9.00 to 10.00
Chicago, No. 1	7.75 to 8.25
Cinci., No. 1 deal.	6.50 to 7.00
Cinci., No. 2	3.00 to 3.50
Cleve., No. 2	8.00 to 8.25
Det., No. 1 new	7.00 to 7.50
St. Louis, No. 1	6.50 to 7.00
Val. new No. 1	12.50 to 13.00

MACHINE TURNINGS

Birmingham	4.00 to 5.00
Boston, dealers	2.75 to 3.00
Buffalo	6.25 to 7.00
Chicago	5.50 to 6.00
Cinci., deal	5.00 to 5.50
Cleveland	7.00 to 7.50
Detroit	5.50 to 6.00
Eastern Pa.	7.00 to 7.50
N. Y., deal.	4.00 to 4.50
Pittsburgh	9.50 to 10.00
St. Louis	4.50 to 5.00
Valleys	10.75 to 11.00

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	2.50 to 2.75
Buffalo	6.25 to 7.00
Cinci., deal.	5.00 to 5.50
Cleveland	7.50 to 7.75
Detroit	6.25 to 6.75
Eastern Pa.	7.00
N. Y., deal.	3.00
Pittsburgh	9.25 to 9.75

CAST IRON BORINGS

Birming., plain	3.50 to 4.50
Boston, chem.	10.00 to 11.00
Boston, dealers	3.25 to 3.50
Buffalo	6.25 to 7.00
Chicago	5.50 to 6.00
Cinci., deal.	5.00to 5.50
Cleveland	7.50 to 7.75
Detroit	6.25 to 6.75
E. Pa., chem.	12.00 to 15.00
N. Y., deal.	3.00
Pittsburgh	8.50 to 9.00
St. Louis	4.75 to 5.25

PIPE AND FLUES

Cinci., deal.	4.50 to 5.00

RAILROAD GRATE BARS

Buffalo	5.00 to 5.50
Chicago, net	7.00 to 7.50
Cincinnati	5.00 to 5.50
Eastern Pa.	8.50 to 9.00
N. Y., deal.	5.25 to 5.50
St. Louis	6.00 to 6.50

FORGE FLASHINGS

Boston, dealers	5.00 to 5.50
Buffalo	9.00 to 9.50
Cleve. ov. 10 in.	9.00 to 9.50
Detroit	7.50 to 8.00

FORGE SCRAP

Boston, dealers	4.00 to 4.50
Chicago (heavy)	11.00 to 11.50
Eastern Pa.	10.00

ARCH BARS, TRANSOMS

Chicago, net	8.00 to 8.50
St. Louis	9.50 to 10.00

AXLE TURNINGS

Boston, dealers	4.50 to 4.75
Buffalo	7.50 to 8.00
Chi., elec. fce.	8.00 to 8.50
Cleveland	9.50 to 10.00
Eastern Pa.	9.50 to 10.00
St. Louis	5.50 to 6.00

STEEL CAR AXLES

Birmingham	11.00 to 11.50
Boston, ship. pt.	8.00 to 8.50
Buffalo	10.00 to 11.00
Chicago, net	10.00 to 10.50
Eastern Pa.	15.50
St. Louis	11.50 to 12.00

SHAFTING

Boston, ship. pt.	9.25 to 9.50
Eastern Pa.	15.00 to 15.50
N. Y., deal.	10.00 to 10.25
St. Louis	8.00 to 8.50

CAR WHEELS

Birming., iron	9.00 to 9.50
Boston, iron deal.	6.75 to 7.25
Buffalo, iron	8.00 to 9.00
Buffalo, steel	11.00 to 11.50
Chicago, iron	9.50 to 10.00
Chi., rolled steel	10.50 to 11.00
Cincinnati, iron	8.50 to 9.00
E. Pa., iron	12.00 to 13.00
E. Pa., steel	13.50 to 14.00
Pitts., iron	11.75 to 12.25
Pitts., steel	14.50 to 15.00
St. Louis, iron	8.50 to 9.00
St. Louis, steel	10.00 to 10.50

NO. 1 CAST SCRAP

Birmingham	9.00 to 10.00
Boston, No. 2	5.00 to 5.50
Boston, Tex. con.	10.75 to 11.00
Buffalo, cupola	10.00 to 10.50
Buffalo (mach.)	10.00 to 11.50
Chicago, agri. net	8.00 to 8.50
Chi., mach. net	9.50 to 10.00
Chi., railroad net	9.00 to 9.50
Cinci., mach. cup.	8.25 to 8.75
Cleve. cupola	10.50 to 11.00
Detroit, net	8.00 to 8.50
E. Pa., cupola	12.00
N. Y., cup. deal.	6.00 to 6.50
N. Y., del. local foundries	9.00 to 9.50
Pitts., cupola	11.50 to 12.00
San Fran., del.	13.50 to 14.00
Seattle	4.50 to 6.50
St. Louis, No. 1	9.00 to 9.50
St. L. No. 1 mach.	9.00 to 9.50

HEAVY CAST

Boston, del.	5.75 to 6.00
Buffalo, break	7.00 to 8.00
Cleve., break	7.50 to 8.00
Detroit break	5.50 to 6.00
Detroit, auto net	8.50 to 9.00
Eastern Pa.	10.50 to 11.00
N. Y., No. 1, deal.	7.00 to 7.50
N. Y., break. deal.	6.25 to 6.75
Pittsburgh	11.00 to 11.50

MALLEABLE

Boston, consum.	12.50 to 13.00
Buffalo	11.00 to 12.00
Chicago, R. R.	10.00 to 10.50
Cinci., agri. del.	8.25 to 8.75
Cinci., R. R. del.	8.75 to 9.25
Cleveland, rail	11.50 to 12.00
Detroit, auto	7.50 to 8.00
St. Louis, R. R.	9.50 to 10.00
Eastern Pa., R. R.	12.50 to 13.00

RAILS FOR ROLLING

5 feet and over

Birmingham	10.00 to 11.00
Boston, dealers	7.00 to 7.25
Buffalo	9.00 to 9.50
Chicago	11.00 to 11.50
Eastern Pa.	12.50
New York, dealer	8.00 to 8.25
St. Louis	10.50 to 11.00

LOCOMOTIVE TIRES

Chicago, cut	10.50 to 11.00
St. L., No. 1	8.50 to 9.00

LOW PHOS. PUNCHINGS

Buffalo	11.00 to 11.50
Chicago	11.00 to 11.50
Eastern Pa.	12.50 to 13.50
Pittsburgh	14.50 to 15.00

most consumers are out of the market. Distress tonnages are small and some railroad lists have been withdrawn, leaving no large surplus of quality scrap.

Cleveland — Small lots make up most of the movement in steel and iron scrap. Consumers are not interested in tonnages until fourth quarter needs are better defined. Closing of a list by the New York Central this week will afford a test of conditions. It includes about 6000 tons of rails and about 3000 tons of miscellaneous rails.

New York—Little buying has followed the recent purchase of No. 2 melting steel by two eastern mills at lower prices. Ban on shipments continues in numerous instances, although Bridgeport, Conn., is taking barge shipments of No. 1 from this territory, the dealer paying $8. Buying against export contracts has served to steady the market, although scrap is not coming out freely at dealers' present bids. No. 1 railroad wrought and specification pipe are easier.

Buffalo—Purchase of No. 2 heavy melting steel is reported to have been made locally at $9, about 1500 tons being sold in this transaction. Dealers consider this distress tonnage and continue to ask as much as $10 for this grade. Deals for tonnage of stove plate are pending. Dealers ask $9 to $9.50.

Detroit—Further weakness has developed in iron and steel scrap, resulting in a 25-cent reduction in borings, turnings, melting steel and compressed sheets. Rails and loose sheet clippings are down 50 cents. Mill orders are infrequent and holdups have been received from the steel strike areas of the Pittsburgh district. Heavy automotive releases for finished products may lift steelworks production and energize the market for scrap early in October, dealers believe.

Boston—Demand for all grades of scrap is dull. Following decline in heavy melting steel, weakness has developed in several other grades. Textile machinery cast has sold at $10.25, delivered, but other cast grades are less active.

St. Louis—Iron and steel scrap continues quiet, new purchasing being confined to small lots of special material. One east side mill is inquiring for a round tonnage of heavy melting steel and other industries would doubtless purchase were it possible to obtain any sort of concessions under quoted prices.

Seattle—Of 9000 tons of railroad equipment in storage since the war, 6000 tons have just been sold to Japanese buyers for scrap. This includes

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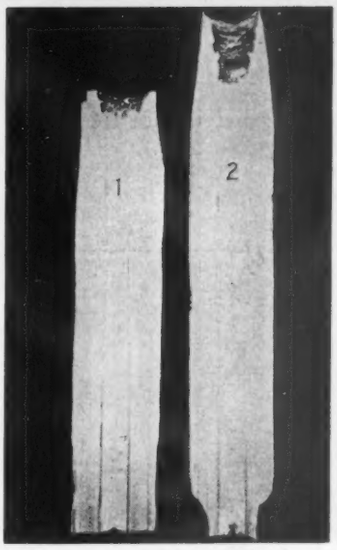

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direct arc melting and refining furnaces for tool and alloy steel ingot production, for steel castings manufacture, ... and the making of plain steels as are used in the Lectromelt billet size ingot process for reinforcing bars . . . . have now been made even more rapid and economic by the new patent . . .

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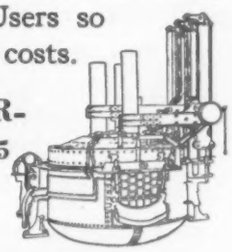

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axles, springs, engines and car bodies. It was fabricated for the Russian government but due to political changes was never shipped. Alaska Railroad has 1200 tons of 40-pound and 300 tons of 35-pound rail in Alaska, offered at $10 gross f.o.b. Oriental buyers are quoting only $6.50, gross, here for scrap rail. The railroads have surplus rail for sale as scrap but their price is $8. Steel and cast iron scrap is somewhat firmer here although good grades are available at about $5, gross.

Cincinnati—Weakness in iron and steel scrap has caused decline in dealers' bids. Current consumer buying is dull. There is little or no distress material.

Philadelphia.—Scrap prices generally are easier, reflecting little activity in any quarter since the recent buying of several thousand tons of No. 2 steel for shipment to Conshohocken, Pa., and Pencoyd, Pa. No. 1 steel is now $10.50, delivered, and No. 2, $9 to $9.50. Several other important grades were reduced 50 cents to $1 a ton.

Birmingham, Ala. — The market for steel and iron scrap is marking time, with prospects the cast iron pipe industry will need larger supplies shortly.

Toronto, Ont.—While some improvement is reported in iron and steel scrap markets, demand is specialized. Foundries are placing orders at regular intervals, but mills are out of the market. Heavy melting steel is moving slowly to domestic consumers, but has a fair call for export.

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The Business Outlook This Fall

The many and varied opinions relating to developments of the National Recovery program and the outlook for business place a burden on every executive to seek as much information as possible in order to guide him in the period ahead.

The current Brookmire Forecaster discusses fully and recommends a policy for the next several months. This report can be valuable to you. It is the opinion of an organization which for twenty-nine years has been relating and interpreting economic forces influencing business and security markets.

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The BROOKMIRE ECONOMIC SERVICE, Inc.
551 Fifth Avenue New York City.

Wire

Shipments Falling Behind; Sales Hold at Good Rate

Wire Prices, Page 57

Cleveland—Mills are two to three weeks behind on shipments of manufacturers' wire and some wire products. Most consumers specified fully on third quarter contracts. As mills, however, are offering to book new business for fourth quarter at unchanged prices, there was not the incentive to cover, as in those products on which prices were increased Sept. 30. Fifty cents per ton has been adopted as the switching rate for figuring delivered prices in the Cleveland district for products with a Cleveland basing point. This was decided as a fair average, though there are actually three different rates.

Pittsburgh—This month should show some improvement in rural demand for merchant wire products, particularly fencing. Last week found several wire product buyers with expiring contracts re-entering the market at $2.10 per keg base on nails. The base on plain maunfacturing wire still is 2.10c, Pittsburgh, with spring wire 3.10c. Woven wire fencing is based on $55 per column.

Chicago—Wire demand is fairly steady and shipments have shown little change. September business was only moderately less than the August volume, and there are expectations of a gain in October. Several consumers of manufacturers' wire are operating at a fairly good rate, but jobbers are taking only small lots.

Boston—Advance buying of wire has been light at 2.20c, Worcester. Shipments continue heavy on specifications. Drawing operations have receded slightly.

Issues More Regulations Affecting Steel Code

(*Continued from Page* 14)

trary charge hereinafter prescribed for such basing point, to-wit:

"(a) for deliveries in carload lots (minimum thirty tons) at Chicago and Evanston, Illinois, and Gary, Indiana, sixty cents (60c) per ton, net or gross, as the case may be;

"(b) for deliveries in carload lots (minimum twenty-five tons) at all other basing points listed in Schedule F of the Code except Gulf ports and Pacific Coast ports, fifty cents (50c) per ton, net or gross, as the case may be; and

"(c) for deliveries in less-than-carload lots at all basing points listed in Schedule F of the Code, except Gulf ports and Pacific Coast ports, ten cents (10c) per cwt., with a minimum of Two dollars ($2) per shipment but not in any case exceeding on any one shipment the charge per carload at the carload rate hereinabove specified for the basing point in question."

Deferred Shipments

Commercial Resolution No. 21

This resolution, adopted by the board Sept. 20, requires the producers to file with the secretary on or before Oct. 5 copies of contracts existing Aug. 19, 1933, for all or part of purchasers' requirements, which were to be specified on or before Sept. 30, but on which shipments will not be completed by Oct. 15. It follows:

"RESOLVED that, if any member of the Code shall be a party to a contract which existed at the effective date of the Code and under which such member has contracted to sell to the other party thereto all or a substantial part of the requirements of such other party of any product to be specified on or before Sept. 30, 1933, and under such contract such other party shall have specified quantities of such products which such member will not be able to ship on or before Oct. 15, 1933, such member shall on or before Oct. 5, 1933, file with the Secretary a copy of such contract and a report showing the amount of such product specified thereunder during the month of September, 1933, and the amount thereof which such member will not be able to ship on or before Oct. 15, 1933, and stating the reasons why such member has accepted specifications under such contract for quantities of such product which such member cannot ship on or before said date."

"Protected" Prices

Commercial Resolution No. 22

This resolution, adopted by the board Sept. 20, provides for price protections for 60 days on identified construction projects. It follows:

"RESOLVED that, if in any case any member of the Code shall have quoted a price for any product to any prospective purchaser thereof for use in an identified construction project and such member of the Code shall have agreed that the quotation of such price shall remain good for a period of 60 days after the date on which any increase in the published base price of such member for such product shall have become effective, such member may, upon any sale or contract for the sale of such product to such prospective purchaser for use in such construction project made at any time within such period of 60 days, allow to such prospective purchaser a deduction from the then published base price of such member for such product in an amount which shall not exceed the amount of any increase in such base price which became effective at the beginning of such period of 60 days."

Imported Products

Commercial Resolution No. 23

This resolution, adopted by the board Sept. 20, has particular reference to prices of imported material sold through a jobber. It follows:

"RESOLVED that, if any member of the Code shall import for sale in the United States any product produced outside of the United States by an affiliated company of such member and such product is not produced in the United States by such member and a base price for such product shall be contained in the list of base prices filed by such member under the Code and such member shall in all respects comply with the provisions of the Code in the sale of such product, such member may, first having obtained the approval of the Committee on Commercial Matters, add to paragraph 5 of the form of agreement which such member shall be required to make with any jobber in respect of such product pursuant to Regulations No. 1 prescribed by the Board on Aug. 29, 1933, a proviso to the effect that such paragraph shall not apply to any such imported product sold to the buyer under such agreement."

Sales Taxes

Commercial Resolution No. 24

This resolution, adopted by the board Sept. 20, provides for allowances for sales taxes on products in intrastate commerce. It follows:

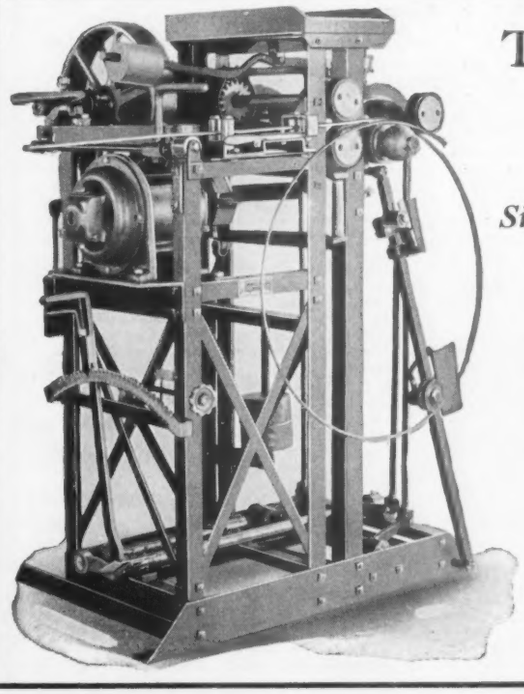
"RESOLVED that any member of the Code which shall sell or contract for the sale of any product in intrastate commerce within the States of California, North Carolina or Oregon may allow to the purchaser of such product a deduction from the base price therefor otherwise chargeable pursuant to the provisions of Section 4 of Schedule E of the Code in an amount which shall not exceed the amount of the sales tax payable upon the sale of such product under the laws of such States, respectively."

Strip

Advance Drives Orders in; New Levels in Effect

Strip Prices, Page 57

Chicago—Strip production has continued fairly active under stimulus of specifications, with new business rather light. Cold strip users have



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specified freely against previous contracts in view of the advance to 2.70c, delivered, scheduled for fourth quarter. Hot-rolled strip is 1.85c.

Philadelphia—Strip buying is quiet with hot-rolled holding at 1.75c, Pittsburgh, or 2.04c, Philadelphia, and cold-rolled at 2.40c, Pittsburgh, or 2.69c, Philadelphia. These delivered prices allow for the elimination of the freight surcharge Oct. 1.

Pittsburgh—Strip steel orders were considerably improved last week because of the approach of the Oct. 1 deadline when advanced prices were uniformly quoted. For the buyer to enter today on new tonnage, 1.75c Pittsburgh, applies on hot-rolled strip steel and 2.40c, Pittsburgh, on cold-rolled.

Cleveland—Shipments continue for at least another week on contracts booked at 1.65c, base, Pittsburgh, for hot-rolled, and 2.25c, base, Cleveland, for cold-rolled. Most consumers, including automotive manufacturers, will have all the material they will require in October by the time third-quarter contracts are completed. Some small lots have been placed here at the advanced prices of 1.75c for hot-rolled and 2.40c for cold-rolled.

New York.—Strip buying is tapering off, with most consumers covered as a result of substantial specifications against third quarter contracts. Hot-rolled is 1.75c, Pittsburgh, or 2.08c New York, and cold-rolled at 2.40c, Pittsburgh, or 2.73c, New York. Contracts for 106 tons of cold-rolled strip for the postoffice department, Washington, have been divided between Griffin Mfg. Co., Erie, Pa., Stanley Works, Bridgeport, Conn., and Elliott Bros. Steel Co., New Castle, Pa.

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PUBLIC SALE

COMMONWEALTH TRUST COMPANY OF PITTSBURGH
Receiver for
THE HAUSMAN AND WIMMER COMPANY
In the Court of Common Pleas of Allegheny County, Pennsylvania
At No. 2915 January Term, 1933, in Equity
Will offer at Public Sale to the highest and best bidder on
TUESDAY, OCTOBER 10, 1933
At One O'Clock P. M. (Eastern Standard Time)
On the premises of THE HAUSMAN AND WIMMER COMPANY, at
MIDLAND, PENNSYLVANIA
On the property of and adjacent to the Mill of the Pittsburgh Crucible Steel Co., at
MIDLAND, PENNSYLVANIA
From Pittsburgh follow Route No. 857 to Rochester, Pa., via Ohio River Boulevard and Route 68 from Rochester to Midland, Pa. Turn left at 10th St. in Midland to Pittsburgh Crucible Steel Company Plant.

Scrap yard machinery and other equipment of the Hausman & Wimmer Company including a Fairbanks Auto Track Scale; Oxygen Manifold; Ideal Heating Boiler; Sundry Milburn Cutting torches; Sundry Carlin Shears; Milwaukee Shears; Canton Shears and D. K. Shears; Sundry Browning Cranes; Sundry Magnets; Lifting Jacks, Westinghouse Motors; Radial Drill Press; Double Emery Grinder; Westinghouse Controller; Oxweld Acetylene Generator; 60-ton Hydraulic Wheel Press with Motor and Switch; Numerous Heavy Duty Shear Blades; Approximately 1500 feet of Pipe with Valves; also 1500 feet of D. C. charging line with Receptacle; also about 130 gross ton Tee Rails, including frogs and switches and dies, together with numerous miscellaneous tools and sundry office furniture.

All of the above articles are to be sold where located and in the condition found by the purchaser, the purchaser to pay all costs of removal from the premises.

TERMS OF SALE

The Receiver will offer the machinery and other equipment of the HAUSMAN AND WIMMER COMPANY located at said premises for sale, first as a whole, reserving the highest bid therefore, and will then offer the same piecemeal. It will then sell the same, subject to the restrictions noted hereafter, either to the highest bidder as a whole if said total bid exceeds the total of the individual bids or to the highest individual bidders piecemeal if the total of their bids exceeds the bid for the whole.

25% of the purchase price shall be paid when the property is knocked down, and the balance shall be paid in cash within 48 hours thereafter; unless upon advice of counsel, the Receiver applies to the Court of Common Pleas of Allegheny County, Pennsylvania, for confirmation of said sale, in which event the remaining 75% of the purchase price shall be paid to the Receiver upon confirmation of said sale by said Court.

The Receiver reserves the right to reject any and all bids, and to adjourn the sale from time to time.

Other information may be obtained from the undersigned.

COMMONWEALTH TRUST COMPANY OF PITTSBURGH,
Receiver,
312 Fourth Avenue,
Pittsburgh, Pa.

Sachs & Caplan,
Attorneys-at-Law,
1124 Frick Building,
Pittsburgh, Pa.

L. Z. Hodil,
Auctioneer,
45 N. Main Street,
Sharpsburg, Pa.

Died:

(*Concluded from Page* 22)

manufacturer, at Passaic, N. J., Sept. 24, Mr. Millwood, a native of Ireland, was a graduate of Queens college, and St. Calman's college. Entering the laboratory, Brooklyn navy yard, in 1896, he became chief chemical engineer in 1901 and resigned in 1915 to join the Okonite organization.

□ □ □

Henry M. Jones, president, Megquier & Jones Co., Portland, Me., structural steel fabricator, in that city, Sept. 20.

□ □ □

Henry S. Northrop, 76, one of the founders of A. Northrop & Co., Pittsburgh, metal stampings, at Rochester, N. Y., Sept. 27.

□ □ □

Nelson Ferguson, 81, former president and secretary of the Pittsburgh Block & Mfg. Co., Pittsburgh, manufacturer of pulleys, forgings and rachets, at Ben Avon, Pa., suburb of Pittsburgh, Sept. 26.

□ □ □

Josiah V. Thompson, 79, in Uniontown, Pa., Sept. 27. At one time he controlled immense coal tracts in Pennsylvania, steel companies having made important purchases through him. He was reputed to be one of the country's richest coal owners, and was associated with the Connellsville coke industry and western Pennsylvania banks. He sustained serious financial reverses just before the World war.

Railroads

Heavy Rail Tonnage Nears; Lower Price Expected

Track Material Prices, Page 57

Possibility of purchase of 700,000 tons of steel rails financed by government loans is heightened by probable submission this week of a lower price than the current $40 per ton. Rail producers have been asked to make bids for tonnage on a lower level. In addition to the rails about 200.000 tons of fastenings would be required. Efforts of the administration toward financing railroad purchases of track material are expected to culminate this week, following a conference last week with the President.

Trade opinion is that a reduction of $2 per ton may be made if any change is agreed on. The expectation is that substantial rail buying will develop in accordance with the government's program but that buying will be done by the railroads individually, with Clayton act opening the rule. These openings may run into December.

Directors of the Chicago, Burlington & Quincy have authorized the purchase of 25,000 tons, the Union Pacific and Illinois Central are expected to buy 20,000 tons each and the Santa Fe 35,000 tons. The New Haven repeats its statement it will buy 20,000 tons. The Lackawanna advises Washington it will buy but the tonnage will depend on price.

Opening bids Sept. 28, the Pensylvania sought to get its contracts on plates, shapes and bars in by Sept. 30 to obtain third quarter prices, which were $2 to $3 lower than for fourth quarter. Bids on other products were also opened, and on Sept. 29 tenders were received on sheets and tubular products. Some 1200 tons of steel were involved in these two openings. Bids were under the Clayton act and difficulties were expected in determining methods of selling. Norfolk & Western closed bids Sept. 29 on about 2500 tons of plates, shapes and bars, routine requirements for fourth quarter. Atlantic Coast Line is taking bids on plates, shapes, bars, car nails and reinforcing bars. Ten delivery points are named.

Car Orders Placed

Electric Metallurgical Sales Corp., New York, six 50-ton hoppers, to American Car & Foundry Co., Chicago.

Locomotives Placed

Lackawanna, three diesel-electric, two to American Locomotive Co., New York, one to Ingersoll-Rand Co., New York. These in addition to nine placed in July.

Warehouse

Volume Holds Fairly Well; New Regulations Trouble

Pittsburgh—Sales of steel out of stock continue to decline and the last six weeks have shown successive contraction in orders. Bars at 2.60c and plates and shapes at 2.85c are about to be advanced, following the $2 and $3 markup on a mill base. The same is true of cold-drawn bars at 3.20c, warehouse. A jobber of cold-drawn bars, cold strip and cold-drawn specialties, is establishing a new warehouse this week in Pittsburgh.

Chicago—September sales were only slightly below the August rate and were also smaller than during July, but October is expected to show seasonal improvement. Prices are unchanged.

Boston—Volume with most New England jobbers is steady, September comparing favorably with August. Demand is well diversified, but most business is coming from the comparatively few larger accounts.

New York—Warehouse volume gained the closing week of last month, several metropolitan district jobbers expanding sales encouragingly. Prices are unchanged, but steady, with advances on some products expected later this month.

Cleveland—The volume of warehouse business in September was below that of August. For some interests it was the first month since May to register an increase. Buyers in all lines still appear to be struggling with codes and code regulations.

Equipment

Orders Still Light; Month's Sales Taper

Chicago — Orders continue light and September sales for a number of interests were well below the August volume. There is a fair demand for some special types of machinery, such as brewing equipment, but quietness continues in orders for common machine tools and in heavier steel plant equipment. Foundry equipment sales are in fair volume but less active than formerly. Railroads are issuing a few inquiries for machinery, all of which involve only small lots. Railroad car and locomotive repair shops are only fairly active but any marked increase in rolling stock requirements would result in improved demand for machine tools and other equipment.

Pittsburgh — Inquiry and orders for heavy steel mill equipment seems to be totally lacking in this district but work on repair parts and rolls held up fairly well in September. Equipment interests face October with the prospect that little change is in sight in the market for large units of steel and rolling mill equipment. Special machinery and machine tools continue in dull demand in this district. An order for motors and control equipment, amounting to about $60,000, has been received by Westinghouse Electric & Mfg. Co. from the Detroit Edison Co.

New York—Inquiry and sales are heavier. Considerable business has been placed by automobile builders, a Cincinnati district interest booking a large order from the Chrysler Corp. for machinery required for crankshaft changes, including lathes. This order is reported to total close to $180,000. Several shipyards are inquiring for miscellaneous tools and the navy has asked bids on eight boring machines. Several dealers in New York territory booked substantial orders during the week. Prices on listed standard tools are firmer, an advance of 15 per cent being made in some cases.

Boston—Machinery and equipment builders are figuring more business, but orders develop slowly. In the metal-working field, sales continue largely for special machinery. There is also a tendency toward higher prices as shop costs have advanced. Buying is usually for one or two tools at a time, but in the aggregate this holds activity to about the summer rate. although in a few instances shop schedules are lower. Textile mill equipment builders continue active on substantial backlogs in several instances.

Cleveland—New business is spotty but trending toward improvement. Miscellaneous machine tool buying is gaining, with new tools moving better than used tools. The latter trend is regarded as an encouraging indicator. September totals in most cases were on a par with averages held throughout the summer months. Car builders in the Detroit district are placing more orders, probably as an outgrowth of model changes. Repair parts are moving in good volume.

Nonferrous Mill Products

Base price cents per pound f.o.b. mill except otherwise specified. Copper and brass product prices based on 9.00c, Conn., for copper

Sheets

Yellow brass (high)	14.75
Copper, hot rolled	17.12½
Lead sheets, cut to jobbers	8.25
Zinc sheets (100-lb. base)	9.00

Tubes and Pipes

Seamless yellow brass (high)	16.37½
Seamless copper	16.62½

Rods

Yellow brass (high, full turnings)	12.25
Naval brass	13.37½

Anodes

Copper, untrimmed	14.50

Wire

Yellow brass (high)	14.75

Old Metals

Dealers' buying prices, cents lb

No. 1 Composition Red Brass

New York	5.00 to 5.25
Chicago	4.62½ to 4.87½
Cleveland	5.50 to 5.75
St. Louis	4.50 to 4.75

Heavy Yellow Brass

New York	3.75 to 4.00

Heavy Copper and Wire

New York	6.75 to 7.00
Chicago, No. 1	6.00 to 6.50
Cleveland	5.75 to 6.50
St. Louis	5.25

Composition Brass Borings

New York	4.75 to 5.00

Yellow Brass Tubing

Cleveland	4.00 to 4.25

Light Copper

New York	5.50 to 5.75
Chicago	4.75 to 5.25
Cleveland	5.25 to 5.75
St. Louis	5.00

Light Brass

Chicago	3.00 to 3.25
Cleveland	3.00 to 3.50
St. Louis	2.75 to 3.00

Lead

New York	3.50 to 3.62½
Cleveland	3.00 to 3.50
Chicago	3.12½ to 3.37½
St. Louis	3.25 to 3.50

Zinc

New York	2.25 to 2.50
Cleveland	2.25 to 2.75
Chicago	2.50 to 2.75
St. Louis	2.75 to 3.00

Aluminum

Clippings, new, soft, Cleve.	13.00 to 14.00
Borings, Cleveland	5.25 to 5.75
Mixed cast, Cleveland	8.25 to 8.50
Mixed cast, St. Louis	8.00 to 8.50

Secondary Metals

Brass ingot, 85-5-5-5	9.00
Remelt aluminum No. 12	12.50 to 13.25

Metals

Quotations Show Remarkable Steadiness—Sales Light but Consumers Specify Well

New York—Nonferrous metal prices held remarkably steady during the past week despite a number of unsettling industrial developments. While new buying in general was not heavy, shipments of the leading metals such as copper, lead, zinc and tin continued in good volume to consumers.

Copper—Domestic sales were in light volume for delivery through the remainder of 1933 and the first few weeks of 1934. All first-hand sellers apparently were maintaining a firm position at the 9-cent level but resale metal continued available in the outside market at ¼-cent less. Business in copper and brass products recently has been fair with some of the Waterbury mills reporting the receipt of more business in September than in August. An early accord on a code for the copper producing trade is looked for under guidance of the government, but mine producers and custom smelters apparently still are in disagreement on production quotas and price fixing. Foreign copper demand picked up somewhat.

Lead—Demand fell off noticeably during the early part of the week following extremely heavy bookings in the preceding period but increased as the week closed. Jobbers, corroders and sheet and pipe makers have been the most active buyers. Bulk of the business has been for October delivery but some already has been placed for November. Sales for September shipment totaled around 25,000 tons and already exceed 20,000 tons for October.

Zinc—Prices held firm although sellers reported only light, carlot business. No shading was heard in any quarter. Ore prices recently have held firm and sentiment in the trade has been bolstered by the indication that the code for all branches of the zinc trade will be rushed through for approval shortly.

Tin—Straits and English refined tin sales were light during the early half of the week but increased later. Ninety-nine per cent tin continued scarce for nearby delivery. Straits dipped to near 47.00c but later stiffened somewhat. Stocks are expected to show a further cut for September.

Antimony—Prices held unchanged but were none too strong.

Aluminum—Virgin prices were unchanged, but secondary was off slightly.

By-Product Prices Steady

New York—Demand for distillates is steady, with toluol and xylol supplies light. Some distributors are behind on contract shipments, and few can take spot business as supplies are coming out slowly. Phenol inquiry is slightly heavier, and some spot business is being done on naphthalene. Prices are unchanged.

Coke By-Products

Per Gallon Producers' Plants, Tank Lots

	Spot
Pure benzol	$0.22
90 per cent benzol	0.22
Toluol	0.36
Solvent naphtha	0.26
Commercial xylol	0.26

Per Pound at Producers' Plants in 250-Pound Drums

Phenol	0.153 to 0.173

Per Pound at Producers' Plants

Naphthalene flakes	4.75 to 5.75
Naphthalene balls	4.75 to 5.75

Per 100 Pounds Atlantic Seaboard

Sulphate of ammonia	$1.20

Quicksilver Stronger

New York—Quicksilver prices are stronger here at $66.50 to $67.50, a virgin flask of 76 pounds, in small lots; and $66 to $67 in round lots. The small lot prices represent an advance of $2 a flask.

Nonferrous Metal Prices of the Week, Cents a Pound

Spot unless otherwise specified

	Copper: Electro., del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead: New York	Lead: East St. L.	Zinc: St. L.	Aluminum 98-99%	Antimony Spot, N. Y.	Ingot Nickel
Sept. 23	9.00	9.12½	8.75	47.60	48.00	4.50	4.35	4.75	*22.90	7.00	35.00
Sept. 25	9.00	9.12½	8.75	47.25	47.65	4.50	4.35	4.75	*22.90	7.00	35.00
Sept. 26	9.00	9.12½	8.75	47.12½	47.50	4.50	4.35	4.75	*22.90	7.00	35.00
Sept. 27	9.00	9.12½	8.75	47.10	47.25	4.50	4.35	4.75	*22.90	7.00	35.00
Sept. 28	9.00	9.12½	8.75	47.50	47.75	4.50	4.35	4.75	*22.90	7.00	35.00
Sept. 29	9.00	9.12½	8.75	48.30	48.55	4.50	4.35	4.75	*22.90	7.00	35.00

*Nominal quotation. Market range 19.90c to 22.90c.

Pacific Coast

Finished Steel Prices Are Up $2 to $3—Highway Work Takes Tonnages—Navy Yard Machine Shop Bids on 3000 Tons Due Soon—State Will Aid Seattle Seawall Project

San Francisco — (*By Air Mail*) — Featuring the market this week was the award of over $2,000,000 worth of highway contracts by the California highway commission. This is the largest letting in the history of the commission and involved over 800 tons of reinforcing bars and 1200 tons of structural shapes.

Awards of reinforcing bars exceeded 1500 tons. Soule Steel Co. booked 250 tons for a mausoleum at Altadena, Calif., and W. S. Wetenhall Co. secured 120 tons for the Irish-American home in San Francisco. Unnamed interests took 279 tons for highway work in ten counties in California for the state. Blue Diamond Co. was awarded 100 tons for a library addition at San Marino, Calif. Subcontracts for over 400 tons for highway work in California are pending. Montana opened bids Sept. 28 for 178 tons for highway work and California opens bids Oct. 11 for 120 tons for a crossing in Kern county.

The plate market remains quiet and no awards of size were noted. Sacramento, Calif., plans a bond election Nov. 7 for funds for a dam and pipeline requiring close to 20,000 tons of plates. Prices are firm at the basing point quotation of 2.15c, f.o.b. cars, Pacific Ports. Effective Sept. 30 the price is 2.25c.

Moore Drydock Co. secured 200 tons for a trestle and 60 tons for miscellaneous structures for the Golden Gate bridge, San Francisco. Judson Pacific Co. took 145 tons for a bridge over Feliz Creek, Mendocino county, California, for the state. New inquiries include 161 tons for a crossing in Kern county, California, for the state. Plain standard shapes hold at 2.15c, f.o.b. cars, Pacific ports, and wide flange material 2.25c. Sept. 30 these prices are increased $2 per ton.

Hot-rolled annealed sheets, No. 10 gage, have been advanced from 2.32½c to 2.42½c, f.o.b. cars, Pacific ports.

Prices in General Rise

Seattle—Effective Sept. 30 mill prices in this territory are: Standard structurals, 2.25c; wide flange, 2.35c; bars, 2.30c, plates 2.25c, base, Pacific ports. This represents a rise of 20c per 100 pounds for shapes and plates, 30c for bars, and no change in reinforcing bars.

Pacific Coast Steel Corp., Seattle, booked 101 tons of shapes for a state bridge in Skagit county and for work at the Puget Sound navy yard. Bids for six road bridges in Alaska, involving 300 tons of shapes, are pending. Local fabricators are preparing figures for approximately 3000 tons of structurals for the machine shop at the navy yard, bids Oct. 9.

Plans are in preparation for the $650,000 steel bridge to cross the Columbia river below the Coulee dam site. West Coast Construction Co., Seattle, is low bidder for a state bridge in Lewis county, Washington, involving 145 tons of reinforcing.

State funds have been allotted to assist the Seattle seawall improvement, involving about 7000 tons of steel, and officials expect to call bids next month.

Cast iron pipe business pending includes 100 tons for Bremerton, Wash., bids Sept. 30, and 425 tons for the Puget Sound navy yard, bids Oct. 4.

Columbia pig iron had advanced from $15 to $16.50, base with usual differentials. Tyneside coke is $14.

Steel in Europe

British Market Brightens; Every Factor Improves

London—(*By Radio*)—Confidence is increasing, inquiries are spreading and Middlesbrough pig iron exports are developing, but prices are low. Preparations are being made for increasing output. East coast hematite trading is improving and semifinished and constructional steelworks are busy but shipbuilding work is scarce. Demand for heavy steel scrap is expanding. Improvement in the Midlands is being maintained and prices tend to rise. The sheet and tin plate position is improved.

The Continent reports potential business is interesting but that trade is hampered by fluctuations in the dollar and sterling. Germany seems to have captured the Belgian tin plate market.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Sept. 27

Export Prices f.o.b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports	£ s d	Continental Channel or North Sea ports, metric tons Gold parity, $4.8665	£ s d
PIG IRON				
Foundry, 2.50-3.00 Silicon	$13.81	2 18 6	$8.27	1 14 0
Basic bessemer	12.74	2 14 0*	7.30	1 10 0
Hematite, Phos. .03-.05	13.92	2 19 0	....	.....
SEMIFINISHED STEEL				
Billets	$24.78	5 5 0	$11.44	2 7 0
Wire rods, No. 5 gage	35.40	7 10 0	21.90	4 10 0
FINISHED STEEL				
Standard rails	$36.58	7 15 0	$26.77	5 10 0
Merchant bars	1.42c	6 15 0	.66c	3 0 0
Structural shapes	1.56c	7 7 6	.61c	2 15 0
Plates, †¼ in. or 5 mm	1.74c	8 5 0	.86c	3 18 6
Sheets, black, 24 gage or 0.5 mm.	1.95c	9 5 0	1.27c	5 15 0
Sheets, gal., 24 gage, corr.	2.37c	11 5 0	1.54c	7 0 0
Bands and strips	1.64c	7 15 0	.83c	3 15 0
Plain wire, base	1.85c	8 15 0	1.18c	5 7 6
Galvanized wire, base	2.22c	10 10 0	1.38c to 1.40c	6 5 6 to 6 7 6
Wire nails, base	2.53c	12 0 0	1.27c	5 5 0
Tin plate, box 108 lbs.	$ 3.95	0 16 9	.....	.....

British ferromanganese $82 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d ($43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

		£ s d	French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$14.75	3 2 6(a)	$12.71	215	$12.90	305	$22.77	63
Basic bessemer pig iron	13.92	2 19 0(a)	*11.52	195	12.27	290	25.12	69.50
Furnace coke	3.19	0 13 6	7.09	120	4.65	110	6.96	19.25
Billets	23.60	5 0 0	23.94	405	18.61	440	34.88	96.50
Standard rails	1.74c	8 5 0	1.89c	700	2.09c	1,100(b)	2.15c	132
Merchant bars	1.45c	6 17 6	1.51c	560	1.02c	535	1.79c	110
Structural shapes	1.85c	8 15 0	1.49c	550	1.02c	535	1.75c	107.50
Plates, †¼-in. or 5 mm	1.79c	8 10 0	.49c	180	1.28c	675	2.07c	127
Sheets, black	2.11c	10 0 0§	2.30c	850‡	1.43c	750‡	2.35c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm	2.64c	12 10 0	3.92c	1,450	2.76c	1,450	5.03c	370
Plain wire	1.85c	8 15 0	3.05c	1,130	2.47c	1,300	2.89c	177
Bands and strips	2.00c	9 10 0	1.67c	620	1.28c	675	2.07c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price.
British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel.
a del. Middlesbrough. b Since January

Here and There in Industry

EDGAR T. WARD'S SONS CO., Pittsburgh, is opening a new steel warehouse Oct. 2 on Woodkirk street, Pittsburgh. Theodore A. Harper has been named manager. Establishment of a Pittsburgh warehouse now brings the total to nine in the Ward company's national chain. Aside from cold-finished steel bars in all shapes and both cold-drawn and turned and polished shafting, the new unit will stock cold-rolled strip steel, cold-rolled round-edge flat wire, shim steel, drill rods and music wire.

□ □ □

Young Radiator Co., Racine, Wis., F. M. Young president, finds its August payroll 100 per cent larger than in April and May. September promises to show a further increase. Growth in orders is partly seasonal and partly the result of diversification of products.

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Colorado Fuel & Iron Co., Pueblo, Colo., is working its iron mines at Sunrise, Wyo., on a restricted basis with about 150 men employed. The ore will be used for the manufacture of nails, wire and fencing, as demand for steel rails, its usual destination, is light.

□ □ □

Lynch Corp., Anderson, Ind., manufacturer of machinery for glass plants, has bought the plant of the Miller Machine & Mould Works Columbus, O., manufacturer of machinery for producing pressed glassware. The Miller plant employs about 75 persons and will be continued in operation, directed from the general offices at Anderson.

□ □ □

Falk Corp., Milwaukee, has received an order valued at about $1,000,000 for herringbone gears and other marine equipment from the New York Shipbuilding Co., recently acquired by the E. L. Cord interests. It is understood the equipment will be used on naval vessels.

□ □ □

Heil Co., Milwaukee, a large consumer of steel plates, is operating fully 50 per cent over the 1932 rate, the best in two years. It is busy on brewery storage tanks, bottle washing vats and similar products and oil burners. Wages have been increased 20 per cent and about 60 men have been added.

□ □ □

Globe Steel Tubes Co., Milwaukee, has met such improvement in demand for its products that for three months it has been operating 24 hours a day with a crew of 620 workers, the largest in three years. About 100 men have been added since going under the NRA code and wages have been revised upward. In spite of full operation a backlog is being accumulated.

□ □ □

American Sheet & Tin Plate Co. marked the forty-first anniversary of its plant at Elwood, Ind., Sept. 13 by operating at capacity with about 1300 persons employed. The plant at its inception in 1892 had four mills and a tinning department of six stacks. About 300 experienced men were imported from Wales to operate the mill. The opening was attended by about 20,000 persons and addresses were made by William McKinley, then governor of Ohio, and Ira Chase, governor of Indiana.

□ □ □

Cedarburg Mfg. Co., Cedarburg, Wis., has been incorporated to take over and continue the business of the American Electric Motor Co., formerly a subsidiary of the Edison interests. Production of electric motors from fractional to 30 horsepower units will be resumed immediately, with about 25 workers. Thorvald Hansen, recently retiring as works manager for the A. O. Smith Corp., Milwaukee, is president and chief engineer, and will direct active management. Crawford Perego is vice president, and Harry Voelz, also formerly with the Smith corporation, is secretary and treasurer.

□ □ □

Superheater Co., New York, has acquired an interest in and assumed management of the Air Preheater Corp., Wellsville, N. Y. The latter retains its corporate identity and continues manufacture of its products at the Wellsville plant. H. S. Colby will remain in the organization as vice president. Executive offices will be consolidated with those of the Superheater Co., 60 East Forty-second street, New York. Sales activities will be co-ordinated with the industrial department of the Superheater Co., William T. Conlon manager. New officers of the Air Preheater Corp. are: President, F. A. Schaff; vice president, H. S. Colby; vice president and treasurer, M. Schiller secretary and assistant treasurer, T. F. Morris; assistant secretary and assistant treasurer, H. S. Marshall.

□ □ □

C. O. Jelliff Mfg. Corp., Southport, Conn., has purchased the assets of the Alloy Products Co., Irvington, N. J. The equipment has been moved to the Jelliff plant in Southport and additional equipment has been purchased, enabling the company to draw wire from the rod to the finest sizes. The company plans to produce a large part of the wire for its own weaving operations and will market certain specialties under the direction of Mr. Kavanaugh, formerly proprietor of the Alloy Products Co., and prior to that of the Standard Alloys Co. Mr. Kavanaugh is now giving his full time to this newly formed wire division. C. O. Jelliff Mfg. Corp. was founded in 1880 and incorporated in 1902, as a manufacturer of wire cloth. Coal screens, foundry riddles. conductor strainers, brass and coper wire cloth and other products have been produced by this company for a number of years.

FOR SALE

STRUCTURAL STEEL and MACHINE SHOP

Land consisting of about 1⅛ acres, buildings, inventory, tools, machinery and all equipment as a whole. Foundry, and controlling interest in a steam pump company under same roof also included. Located on Illinois Central Railroad main line, with connecting side track. Structural shop has a capacity of about 400 tons of fabricated steel per month.

To settle an estate, plant must be sold promptly. Cheap for cash.

For further information, write

H. M. Kessler, *Trustee*,
301 Speed Building,
Louisville, Kentucky

Construction and Enterprise

New England

HOLYOKE, MASS. — Massachusetts Supply Corp. has been incorporated with $100,000 capital to conduct a boiler and pipe supply business, by Charles D. Heywood, Vincent P. Marran and Clifford S. Lyon, all of Holyoke.

New York

NEW YORK—Superior Scrap Iron Co. Inc. has been incorporated with $10,000 capital to operate a business in scrap iron and metals, by Newman & Newman, 280 Broadway, New York.

SYRACUSE, N. Y.—B. & R. Iron & Metal Co. Inc. has been incorporated with 100 shares no par value to manufacture hardware, by Bert E. Bernstein, State Tower building, Syracuse.

New Jersey

NEWARK, N. J.—Big Four Steel Erection Co. Inc. has been incorporated with 100 shares no par value to do a general contracting business, by George F. Corrigan Jr., 60 Branford place, Newark, N. J.

Pennsylvania

TITUSVILLE, PA.—Pennsylvania Refining Co. is negotiating for additional property along Oil creek at Brown street for plant extension. Adam C. Mosher is superintendent.

Michigan

ALBION, MICH. — Fafnyer Forge Corp., A. J. Peining, Detroit, president, has bought the Kelsey-Hayes Wheel Corp. plant here, closed for three years, and will use it for the manufacture of metal products. Orders for several months are in hand.

DETROIT—Michigan Metalcraft Co. Inc., 6527 Russell street, has been incorporated with $6000 capital to manufacture metal stampings, by E. J. Anderson, 15725 Woodingham drive, Detroit.

DETROIT—West Side Foundry Co., 8955 Thaddeus street, has been incorporated with $1000 capital to operate a foundry and machine shop, by Mike Syzdek, 4646 St. Aubin avenue, Detroit

DETROIT—Universal Brass Products Co., 13440 Klinger avenue, has been incorporated with $40,000 capital to manufacture brass products, by Walter Bettinger, 2472 Riopelle street, Detroit.

DETROIT—Advance Mfg. Co., 2700 Franklin street, has been incorporated with $5000 capital to manufacture and deal in tools and dies, by J. Garfield Alber, 1601 Bewick avenue, Detroit.

DETROIT — Ohio Metal Products Corp., Transportation building, Detroit, has been incorporated with 50,000 shares no par value to manufacture metal products, by H. H. Harrold, Wooster, O.

GREENVILLE, MICH.—R. J. Tower Iron Works Inc. has been incorporated with $50,000 capital to operate a foundry and machine shop, by Francis E. Tower, Greenville, Mich.

HANCOCK, MICH. — William O. Baysinger, 3901 North Frederick avenue, Milwaukee, and associates, have bought the old Park brewery here and will recondition it at a cost of about $200,000. Full new equipment will be installed.

Indiana

EVANSVILLE, IND.—Advance Stove Works has been reorganized with 600 shares of $100 par value, 5000 shares of $10 par value and 60,000 shares no par value.

SOUTH BEND, IND.—J. Sculman & Son Inc., 710 Western avenue, has been incorporated to deal in iron, steel and other metals, by Jacob, Sam and Albert Schulman.

Illinois

BELLEVILLE, ILL.—Illinois Enameling Co., 1100 South Charles street, has been incorporated with 500 shares no par value to carry on a metal enameling business, by Roesch Enamel Range Co., North Twenty-fourth and West Main streets, Belleville, Ill.

CHICAGO—Bulanda Mfg. Co., 5001 South Ashland avenue, has been incorporated with 200 shares capital stock to manufacture automobile accessories and other metal products, by Edward E. Ronkowski and associates, 5001 South Ashland avenue.

CHICAGO—Cohen Iron & Steel Co., 2241 South Loomis avenue, has been incorporated with 140 shares capital stock to deal in scrap iron and steel and metals, by Irving Greenfield, 1003 Steuben building, 188 West Randolph street.

CHICAGO—Century Wrecking Co., 1 North LaSalle street, has been incorporated with 5000 shares capital stock to conduct a general engineering, constructing, wrecking business, by Miller Gorham, Wales & Adams, 1 LaSalle street building.

CHICAGO—R. W. Glasner, formerly president of the Marquette Tool & Mfg. Co., which has discontinued its manufacturing operations at Chicago, has formed the Clearing Machine Corp. and has taken over the building at 6499 West Sixty-fifth street in the Clearing industrial district, formerly occupied by the Marquette company.

MATTOON, ILL.—W. C. Beck Mfg. Co., 1708½ Broadway, has been incorporated with 500 shares no par value to manufacture portable softeners, pumps, machinery and tools, by O. H. Douglas, New City Hall, Mattoon, Ill.

ROCKFORD, ILL.—Crescent Machine Tool Co., 3599 Ninth street, has been incorporated with 10,000 shares no par value to manufacture machinery, tools and specialties, by F. J. C. Krahn, 903 Talcott building, Rockford, Ill.

SPRINGFIELD, ILL.—Plans are being prepared for a municipal power plant, 95 x 138 feet and 105 feet high, to cost about $175,000. Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., is engineer.

Southern States

WILMINGTON, DEL.—DuPont Rayon Co., Wilmington, Del., plans improvements to cost $3,000,000 to its rayon plant at Old Hickory, Tenn.

JACKSONVILLE, FLA. — Jacksonville Iron & Metal Co. has been organized by A. Hasberg, H. Katz and Pearl Safer.

LOUISVILLE, KY.—Louisville Iron & Metal Co. has been incorporated with $3000 capital to conduct a business in scrap iron, steel and metals, by Sam Wasbutsky and associates.

SHREVEPORT, LA.—O'Donnell Iron Works has been incorporated with $15,000 capital, by T. R. O'Donnell, Keithville, La., president, and associates.

West Virginia

WHEELING, W. VA.—Tinsley Steel Co., 15 Bae Mar place, has been incorporated with $25,000 authorized capital, by George C. Tinsley and associates.

Arkansas

LITTLE ROCK, ARK.—J. M. Pittman and H. D. Brown have established a foundry on West Sixth street to manufacture gray iron, brass, aluminum and bronze castings.

Oklahoma

OKLAHOMA CITY, OKLA.—Thomas G. Banks, water superintendent, has presented an estimate to the city council on the cost of a municipal electric light and power plant, placing it at $511,000. Erection of a gas plant is among the matters being considered by the council.

Wisconsin

FORT ATKINSON, WIS. — Fluor Bros. & Smith Co., Oshkosh, Wis., has been awarded a contract for the new municipal sewage plant here at $38,100.

MENOMONEE FALLS, WIS.—Milwaukee interests have leased the former beet sugar plant here and will remodel it into a brewery at cost of about $120,000. H. V. Esser, architect, 757 North Broadway, Milwaukee, is in charge.

LA CROSSE, WIS.—G. Heilman Brewing Co., H. Dahl, president, is having plans drawn for a brewery, including two 300-horsepower boilers, electric refrigeration, filters, pumps and other equipment, at total cost of $150,000.

South Dakota

WOONSOCKET, S. DAK.—Sanborn county machine shop practically destroyed by fire with loss of $10,000, partly insured.

Pacific Coast

AUBURN, WASH.—City plans to spend $12,000 to match an equal sum from state and federal funds for waterworks improvements.

New Trade Publications

FURNACE—Its razor blade furnace is described by the W. S. Rockwell Co., 50 Church street, New York, in its bulletin No. 341.

NICKEL TIN—American Nickeloid Co., Peru, Ill., has issued a circular describing uses of its nickel tin and chrome tin for various metal products.

GRINDING WHEELS—Norton Co., Worcester, Mass., has issued a booklet on grinding wheel specifications, giving a large quantity of data on grinding wheels.

WIRE—Bethlehem Steel Co., Bethlehem, Pa., has distributed a leaflet on its zinc-coated wire, produced by a new process giving results fully described in the text.

REFRACTORIES — Standard Fuel Engineering Co., Detroit, in a current bulletin describes its complete line of refractory products, now sold under the trade name Zero.

VALVES—Jenkins Bros., 80 White street, New York, has issued its catalog No. 23, containing much information on valves and valve layout in a wide variety of types and patterns.

PRESSES——Zeh & Hahnemann Co., 182 Vanderpool street, Newark, N. J., in a current bulletin features its percussion power presses, with illustrations and data on the various types.

MOTORS—A 4-page leaflet has been issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., on a new line of splash and drip-proof motors and control, for use where splashing occurs.

SPECIAL STEELS — Firth-Sterling Steel Co., McKeesport, Pa., has issued a leaflet describing its tool and alloy steels, each type being given a description and a suggestion for its use in industry.

GALVANIZING FURNACES—Surface Combustion Corp., Toledo, O., has issued bulletins SC-46 and SC-47 describing galvanizing furnaces in the first and burners and burner equipment in the second.

BLOWERS — Roots - Connersville-Wilbraham, Connersville, Ind., in Bulletin 21-B16 describes its line of Victor-Acme blowers, in small sizes, up to seven pounds pressure or vacuum. Illustrations and data are given.

REDUCTION CRUSHER — Traylor Engineering & Mfg. Co., Allentown Pa., in Bulletin No. 2110 covers its type TZ reduction crusher, fully illustrated in color and accompanied by tables of capacities, parts list and other data.

PULVERIZED COAL—A bulletin on the use of pulverized coal in the foundry has been prepared for distribution by the Whiting Corp. Harvey, Ill. Illustrations and descriptive matter show applications in various foundry units.

GAS CARBURIZING FURNACES—Surface Combustion Corp., Toledo, O., has issued a bulletin on its continuous gas carburizing furnace. The process in which this type of furnace is used is described and performance data are presented.

TESTING MACHINES — Baldwin-Southwark Corp., Philadelphia, in bulletin No. 50, describes and illustrates the Southwark-Heydekampf testing machines in capacities up to 200,000 pounds. It is illustrated.

FEEDERS—Traylor Vibrator Co., 1400 Delgany street, Denver, has published bulletins describing its electric feeder for laboratory use, and its feeder conveyors designed for industries requiring accurately controlled feeds.

TRIMMER—Oliver Machinery Co., Grand Rapids, Mich., has published a folder illustrating and describing its new equipment for trimming various ends and angles. The equipment is a precision tool designed particularly for the pattern shop.

AUTOMATIC CONTROLLERS—Johnston Mfg. Co., 2825 East Hennepin avenue, Minneapolis, in bulletin No. 1020 describes its line of automatic controllers for oil burners by balancing burner delivery against heat demands of the furnace or oven.

CRANES AND SHOVELS—Link-Belt Co., 300 West Pershing road, Chicago, is distributing three bulletins on its models K34, 44 and 55, crawler-mounted shovel crane and dragline equipment. Lifting capacities, clearance diagrams and other data are included.

FEED WATER REGULATORS—Northern Equipment Co., Erie, Pa., has issued a catalog covering its feed water regulators and allied equipment. The devices are described and illustrated and numerous diagrams and graphs show operation and accomplishments.

MAGNETIC SEPARATION—Magnetic Mfg. Co., Milwaukee, in bulletin No. 100 describes the services of its Stearns testing laboratory for magnetic separation. Engineering advice is given on various problems met in seeking separation of magnetic materials from a wide variety of products.

PUMPS—Side suction volute pumps form the subject matter of a bulletin, No. 149, just issued by the Morris Machine Works, Baldwinsville, N. Y. Recent improvements in design are described, various types of drive are illustrated and complete rating tables given. with other data.

MOTORS — Long-hour-duty split-phase motors are described in a 6-page bulletin by the Wagner Electric Corp., 6391 Plymouth avenue, St. Louis. Illustrations of motor parts are accompanied by full description of the parts, their functions and construction. The bulletin is No. 167.

PYROMETERS—Mishawaka Industrial Instrument Mfg. Laboratory, 936 Washington avenue, Mishawaka, Ind., has published a folder describing and illustrating its line of indicating pyrometers for panel mountings, wall mountings, portable use and multiple point installations. Standard instrument ranges are from 800 to 3000 degrees Fahr.

PRESSED STEEL—Lukens Steel Co., Coatesville, Pa., has issued a leaflet on its pressed steel products for tank builders, including oval heads for basement tanks, double dished heads, shallow dished heads and manholes with covers. Drawings and specifications accompany the descriptive matter.

HYDRAULIC EQUIPMENT—Logansport Machine Co., Logansport, Ind., in its catalog AH-30 describes, gives dimensions and specifications of its line of electric hydraulic power devices, hydraulic cylinders, control and operating valves, chucks, cylinders and devices for air and hydraulic operation.

HUMIDITY INSTRUMENTS — Amthor Testing Instrument Co. Inc., 309 Johnson street, Brooklyn N. Y., has issued Bulletin 108, describing its direct-reading precision hygrometers, recorders and other instruments for determining accurately all air conditions. Their use in air-conditioning installations is suggested.

VERTICAL MOTORS—Vertical motors form the subject of a looseleaf bulletin by the Wagner Electric Corp., 6400 Plymouth avenue, St. Louis, Mo. It illustrates and describes three types of vertical motors and illustrates their applications. It also explains how horizontal-type motors can be mounted vertically.

PHOTOELECTRIC RELAYS—General Electric Co., Schenectady, N. Y. in Bulletin 1654A describes and illustrates its CR7505 photoelectric relay, designed for numerous control problems in industry. Advantages over conventional control devices are suggested. Illustrations show applications to various problems met in control engineering.

MOLYBDENUM—Climax Molybdenum Co., 295 Madison avenue, New York, has issued its annual booklet on molybdenum in the current year, covering the benefits conferred by molybdenum as an alloying element in steel and iron, with the engineering advantages resulting therefrom. Many diagrams, tables and illustrations are included.

BEARINGS—Tyson Roller Bearing Corp., Massillon, O., has published a booklet containing recommendations and engineering data for application of its cageless tapered roller bearings in mine and quarry cars with through and stub axles, inside and outside boxes. Reproductions of blue prints detailing principles involved are included and load capacity tables are given.

PUMPS—Chain Belt Co., Milwaukee, has prepared a 16-page catalog, Bulletin No. 240, covering its line of Rex speed prime pumps. The theory of self-priming pumps is presented and the value of air-handling capacity to a centrifugal pump discussed. Data to aid the engineer are presented, the publication being in effect a pump handbook.

INTERLOCKING CHANNEL FLOOR—Belmont Iron Works, Philadelphia, has prepared a bulletin on its rolled structural steel interlocking floor. Details of its appliction to bridge floors are described and illustrated and photographic reproductions show installations under use. Standard specifications and tables of safe loads are included.

WHERE-TO-BUY

A classified list of advertisers according to products. ¶Index to advertisements gives page number of any advertiser.

ABRASIVES (Polishing)
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ACCUMULATORS
Logemann Brothers Co., 3126 Burleigh St., Milwaukee.
Morgan Engineering Co., The, Alliance, O.

ACETYLENE
Air Reduction Sales Co., 40 E. 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York City.

ACIDS (Pickling)
American Chemical Paint Co., Ambler, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANGLE IRON BENDERS
Excelsior Tool & Machine Co., Ridge and Jefferson Aves., East St. Louis, Ill.

ANODES (All Type)
Udylite Process Co., 3953 Bellevue Ave., Detroit, Mich.

ARBORS
Morse Twist Drill & Machine Co., New Bedford, Mass.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BALING PRESSES
Logemann Brothers Co., 3126 Burleigh St., Milwaukee.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Acme Steel Co., 2840 Archer Ave., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp. Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BAR BENDERS
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.

BARRELS (Plating)
Udylite Process Co., 3953 Bellevue Ave., Detroit, Mich.

BARS (Alloy)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Co., Canton, O.

BARS (Concrete Reinforcing)
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Great Lakes Steel Corp., Ecorse, Mich.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEAMS, CHANNELS, ANGLES, ETC.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEARINGS (Ball)
Bantam Ball Bearing Co., The, South Bend, Ind.

BEARINGS (Bronze)
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., 344-54 W. 6th St., Tarentum, Pa.

BEARINGS (Journal)
Bantam Ball Bearing Co., The, South Bend, Ind.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
Bantam Ball Bearing Co., The, South Bend, Ind.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
Bantam Ball Bearing Co., The, South Bend, Ind.
Timken Roller Bearing Co., The, Canton, O.

BENDING AND STRAIGHTENING MACHINES
Alliance Machine Co., The, Alliance, O.
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.
Logemann Bros. Co., 3126 Burleigh St., Milwaukee.
Morgan Engineering Co., The, Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Construction Co., 1301 Koppers Bldg., Pittsburgh.
Youngstown Sheet & Tube Co., Youngstown, O.

BILLET CHIPPERS—SEE CHIPPERS (Billet)

BILLETS (Alloy and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. La Salle St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Midvale Co., The, Nicetown Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Timken Steel & Tube Co., Canton, O.

BILLETS AND BLOOMS
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Strong, Carlisle & Hammond Co., The, 1394 W. 3rd St., Cleveland, O.

BOILERS
Murray Iron Works Co., Burlington, Iowa.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.

BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.
Ryerson, Jos. T., & Son, Ins. 16th and Rockwell Sts. Chicago Ill.

BOXES (Annealing)
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

BOXES (Case Hardening)
Strong, Carlisle & Hammond Co., The, 1394 W. 3rd St., Cleveland, O.

BOXES (Open Hearth Charging)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co. 7000 Central Ave., Cleveland, O.

BRAKES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.

BRICK (Fire Clay)
Eureka Fire Brick Works, 1015 House Bldg., Pittsburgh, Pa.
Strong, Carlisle & Hammond Co., The, 1394 W. 3rd St., Cleveland, O.

BRICK (Silica)
Carborundum Co., The, Perth Amboy, N. J.

BRICK (Silicon Carbide)
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)
Alliance Machine Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland.

BRIDGES, BUILDINGS, VIADUCTS, STACKS
American Bridge Co., Frick Bldg., Pittsburgh, Pa
Belmont Iron Works, 22nd and Washington Ave., Philadelphia, Pa.
International-Stacey Corp., Columbus, O.
McClintic-Marshall Corp., Bethlehem, Pa.
Ohio Structural Steel Co., The, Newton Falls, O.
Truscon Steel Co., Youngstown, O.

STATISTICS OF IRON AND STEEL INDUSTRY

Compiled by department of commerce, except: Unfilled tonnage by United States Steel Corp.; foundry equipment orders by Foundry Equipment Manufacturers association; river traffic by United States engineer at Pittsburgh; electric power by department of interior, geological survey

Automobiles

Units

1932	Production —United States— Total*	Passenger cars	Canada Total
Jan.	119,344	98,706	3,731
Feb.	117,413	94,085	5,477
Mar.	118,959	99,325	8,318
April	148,326	120,906	6,810
May	184,295	151,683	8,221
June	183,106	160,103	7,112
July	109,143	94,678	7,472
Aug.	90,325	75,898	4,067
Sept.	84,150	64,735	2,342
Oct.	48,702	35,102	2,923
Nov.	59,557	47,293	2,204
Dec.	107,353	85,858	2,139
Year	1,370,678	1,134,372	60,816
1933			
Jan.	130,044	108,321	3,358
Feb.	106,825	91,340	3,298
March	117,949	99,225	6,632
April	180,667	152,939	8,255
May	218,303	184,578	9,396
June	253,322	211,448	7,323
July	233,088	195,019	6,540
August	236,480	195,076	6,079
8 Mo.	1,476,678	1,238,012	50,881

*Difference of total and passenger cars equals number of trucks. †Average monthly shipments, 1922-23-24 taken as 100.
‡Figures by American Institute of Steel Construction, from January, 1933, 75 per cent of industry reporting.

Fabricated Shapes‡

Net Tons

1932	Bookings Tonnage	Per cent of capacity	Shipments Tonnage	Per cent of capacity
Jan.	48,400	12.1	65,600	16.4
Feb.	62,000	15.5	78,000	19.5
Mar.	64,400	16.1	82,400	20.6
April	64,800	16.2	68,400	17.1
May	90,800	22.7	72,400	18.1
June	86,800	21.7	83,200	20.8
July	69,200	17.3	83,600	20.9
Aug.	78,800	19.7	85, 00	21.4
Sept.	111,200	27.8	90,800	22.7
Oct.	74,400	18.6	86,400	21.6
Nov.	51,600	12.9	76,000	19.0
Dec.	145,600	36.4	68,800	17.2
Year	948,000	19.8	942,400	19.6
1933				
Jan.	73,679	....	50,965	....
Feb.	50,955	....	46,168	....
March	71,398	....	54,948	....
April	46,095	....	50,387	....
May	42,600	....	63,968	....
June	81,910	....	64,809	....
July	56,234	....	50,973	....
August	....	....	....	....
8 Mo.	....	....	....	....

Fabricated Plates

Net Tons

1932	Bookings Total	Oil Storage Tanks	Miscellaneous
Jan.	17,613	4,783	12,124
Feb.	17,755	4,115	11,777
Mar.	12,564	1,161	10,022
April	14,074	1,406	11,167
May	11,788	2,310	9,356
June	18,383	2,808	10,209
July	12,485	3,661	6,586
Aug.	11,916	4,394	6,911
Sept.	11,013	3,753	6,801
Oct.	16,737	5,941	9,528
Nov.	7,873	1,446	6,065
Dec.	9,510	3,154	5,534
Year	161,810	38,976	109,085
1933			
Jan.	11,128	1,501	8,830
Feb.	16,588	8,347	7,660
March	8,903	1,270	6,787
April	9,502	2,938	6,291
May	16,243	2,858	8,183
June	37,020	20,894	14,013
July	20,058	6,013	11,417
August	.....	.....	.....
8 Mo.	.....	.....	.....

Railroad Locomotives

Units Shipments

1932	Domestic	Foreign
Jan.	..	..
Feb.	1	4
Mar.	..	3
April	8	..
May	13	2
June	17	..
July	9	..
Aug.	9	..
Sept.	9	4
Oct.	10	2
Nov.	8	..
Dec.	6	..
Year	80	15
1933		
Jan.	2	..
Feb.	3	..
March	2	..
April	1	..
May	1	..
June	0	2
July	..	..
August	2	1
8 Mo.	11	3

Foundry Equipment Order Index †

1932	
Jan.	20.5
Feb.	27.6
Mar.	27.5
April	13.7
May	18.0
June	14.2
July	18.7
Aug.	18.6
Sept.	11.9
Oct.	23.2
Nov.	11.5
Dec.	16.5
Year	....
1933	
Jan.	68.4
Feb.	16.1
March	9.8
April	19.4
May	25.7
June	45.5
July	48.6
August	56.2
8 Mo.	....

Malleable Castings

Net Tons

1932	Output	Shipments	Orders booked
Jan.	20,399	19,658	20,332
Feb.	19,834	19,432	17,808
March	17,844	19,392	16,235
April	15,461	16,847	16,185
May	16,597	18,075	16,463
June	15,018	16,450	13,330
July	9,447	11,359	8,658
August	6,804	8,631	7,776
Sept.	10,051	9,746	10,582
Oct.	12,274	11,615	12,850
Nov.	13,622	12,745	14,304
Dec.	14,128	14,366	14,504
Year	171,479	178,316	169,027
1933			
Jan.	12,577	14,248	12,404
Feb.	13,575	14,068	11,077
March	9,756	10,967	12,380
April	17,871	16,666	17,856
May	24,628	23,077	24,671
June	31,118	29,268	31,997
July	30,865	29,155	28,458
August	31,811	30,195	28,323
8 Mo.	173,365	168,563	168,324

Steel Castings

Net Tons

1932	Total bookings	Total production
Jan.	17,393	18,395
Feb.	17,015	18,759
March	16,593	20,433
April	12,801	17,474
May	11,342	14,463
June	12,765	12,839
July	9,301	11,460
August	10,147	12,331
Sept.	11,883	11,337
Oct.	11,896	12,480
Nov.	13,235	13,712
Dec.	13,283	13,886
Year	155,837	175,831
1933		
Jan.	12,942	13,951
Feb.	11,857	12,438
March	11,458	13,209
April	14,507	12,071
May	20,782	19,072
June	32,026	27,300
July	29,505	29,240
August	29,057	30,992
8 Mo.	162,134	157,273

Mechanical Stokers

—Sales—

1932	Fire tube boilers	Water tube boilers
Jan.	70	45
Feb.	63	26
March	60	23
April	80	15
May	41	30
June	65	48
July	70	44
August	99	38
Sept.	117	46
Oct.	96	21
Nov.	79	12
Dec.	78	20
Year	920	367
1933		
Jan.	50	13
Feb.	33	22
March	67	17
April	26	31
May	52	41
June	137	50
July	105	67
August	....	....
8 Mo.	....	....

Steel Furniture

Dollars, 000 omitted

1932	Business shipments	Shelving, shipments
Jan.	977	269
Feb.	807	229
March	780	259
April	753	190
May	653	196
June	671	177
July	521	155
August	543	141
Sept.	577	146
Oct.	622	142
Nov.	581	125
Dec.	610	135
Year	8,102	2,166
1933		
Jan.	582	121
Feb.	464	104
March	482	137
April	404	133
May	511	166
June	636	165
July	522	156
August	693	178
8 Mo.	4,297	1,164

Babbitt Metal

Pounds 000 omitted

1932	(a) Total production	(b) Sales
Jan.	1,743	1,281
Feb.	1,577	1,142
March	1,595	1,188
April	1,419	1,060
May	1,345	947
June	1,319	858
July	1,275	870
August	1,319	994
Sept.	1,406	1,108
Oct.	1,573	1,192
Nov.	1,265	944
Dec.	1,149	823
Year	16,990	12,412
1933		
Jan.	1,346	1,073
Feb.	1,117	917
March	1,134	941
April	1,544	1,270
May	2,110	1,785
June	2,327	1,877
July	2,484	1,941
August	2,753	2,059
8 Mo.	14,880	11,868

(a) by 40 plants. (b) by 30 manufacturers who produce for sale, including 5 who also report consumption of own metal.

Unfilled Tonnage

Tons

1932	United States Steel Corp. Unfilled orders	Net change	Per cent change
Jan.	2,648,150	87,203—	3.19—
Feb.	2,545,629	102,521—	3.88—
March	2,472,413	73,216—	2.87—
April	2,326,926	145,487—	5.88—
May	2,177,162	149,764—	6.44—
June	2,034,768	142,394—	6.54—
July	1,966,302	68,466—	3.36—
Aug.	1,969,595	3,293+	0.16+
Sept.	1,985,090	15,495+	0.78+
Oct.	1,977,040	11,950+	0.62+
Nov.	1,968,301	28,739—	1.45—
Dec.	1,968,140	161—	0.01—
Year	.....	...	.....
1933			
Jan.	1,898,644	69,495—	3.50—
Feb.	1,854,200	44,444—	2.30—
March	1,841,002	13,198—	0.70—
April	1,864,574	23,572+	1.27+
May	1,929,815	65,241+	3.49+
June	2,106,671	176,856+	9.16+
July	2,020,125	86,546—	4.10—
August	1,890,444	129,681—	6.40—
8 Mo.	.....	....	....

Electric Power

1932	Millions Kilowatt Hours Production*
Jan.	7,567
Feb.	7,023
March	7,323
April	6,790
May	6,650
June	6,563
July	6,547
Aug.	6,764
Sept.	6,752
Oct.	7,073
Nov.	6,952
Dec.	7,149
Year	83,153
1933	
Jan.	6,932
Feb.	6,285
March	6,674
April	6,462
May	6,996
June	6,231
July	7,463
August	.....
8 Mo.	.....

*For public use

Coke

Net Tons Production

1932	By-Product	Beehive
Jan.	2,100,923	87,900
Feb.	1,995,780	85,800
March	2,089,391	87,400
April	1,883,391	56,000
May	1,742,517	45,000
June	1,536,712	41,200
July	1,523,422	38,200
Aug.	1,473,904	40,700
Sept.	1,544,491	45,700
Oct.	1,738,716	67,600
Nov.	1,751,581	81,400
Dec.	1,786,085	95,600
Year	21,166,913	772,500
1933		
Jan.	1,784,527	81,900
Feb.	1,638,817	84,100
March	1,666,035	93,300
April	1,656,183	47,000
May	1,921,257	47,300
June	2,241,432	50,100
July	2,797,316	68,400
August	2,923,418	70,600
8 Mo.	16,628,985	542,700

Steel Barrels

Units

1932	Production	Shipments
Jan.	359,685	352,135
Feb.	367,472	369,882
March	452,294	453,621
April	447,379	452,191
May	427,299	425,662
June	651,916	654,561
July	352,614	353,336
Aug.	362,993	360,509
Sept.	395,640	398,241
Oct.	422,637	417,490
Nov.	373,190	376,647
Dec.	300,570	307,372
Year	4,920,117	4,928,307
1933		
Jan.	292,201	292,609
Feb.	269,755	272,432
March	373,340	371,945
April	401,086	402,506
May	465,418	467,695
June	572,851	568,437
July	555,402	552,923
August	480,670	470,632
8 Mo.	2,410,725	3,399,179

River Traffic

Net Tons

1932	Allegheny	Monongahela	Ohio
Jan.	.....	25,327	45,199
Feb.	2,200	20,089	40,737
March	550	32,234	33,254
April	501	23,849	32,972
May	2,550	23,941	28,267
June	3,611	18,291	27,306
July	1,400	13,677	22,895
Aug.	3,400	26,390	43,621
Sept.	1,200	18,831	28,557
Oct.	21,280	24,305	40,399
Nov.	23,225	29,851	45,735
Dec.	7,200	28,169	30,048
Year	67,117	284,954	418,990
1933			
Jan.	1,627	11,724	18,002
Feb.	1,656	17,904	23,614
March	425	19,546	32,917
April	3,025	35,795	37,191
May	4,400	39,890	46,038
June	815	58,179	56,484
July	3,900	68,453	62,096
August	3,234	67,389	69,531
8 Mo.	19,082	318,890	345,873